

STS-108 Run 1

\*2921332 \*

NOV 12 01

WC  
140  
USA

# PROCESSING OPERATIONS CONTROL OMI PLANNING SHEET



Wad Number S6444-J02-R01	SITE LCC	Elem CD V	End Item 105 FLT: 017	DATE: 11/09/2001 TIME: 13:01:33
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Title: SSV ICE AND DEBRIS ASSESSMENT	Sub Element/Zone 30
-----------------------------------------	------------------------

Project Work Order No.	Hazard: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	SFOC Safety N/A TOTAL BOOK	WC 150 USA	<input type="checkbox"/> Local Copy <input checked="" type="checkbox"/> Firing Room Copy
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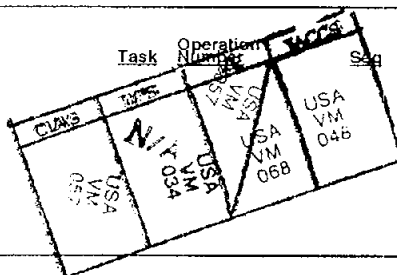
Authorizing Document ORB517-263(ADD)	Material & Equipment: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	MICR Req'd <input type="checkbox"/> Yes <input type="checkbox"/> No	NOV 12 01	OMRS: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
-----------------------------------------	----------------------------------------------------------------------------------------------	------------------------------------------------------------------------	-----------	------------------------------------------------------------------------------

## PERFORM THE FOLLOWING:

### Pre-Ops Setups

Task	Operation Number	Seq	Steps
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Task	Operation Number	Seq	Steps
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### OPS Support

Task	Operation Number	Seq	Steps
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Task	Operation Number	Seq	Steps
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### Operating Instructions

Task	Seq	Steps
	010	
	015	
	020	
	030	
	040	
	050	
	060	
	070	

Task	Seq	Steps
	080	
	090	
	100	
	110	
	120	
	130	
	140	
	145	

### Post Ops

Task	Operation Number	Seq	Steps
------	------------------	-----	-------

### Appendices

Task	Seq
N/A	

### Subtask WAD's

N/A

Planner LISA RUTKOWSKI	WC 150 USA	Ext 0746	QC Closure SPC 490	Date DEC 4 01	Page 1 OF 2
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DEC 14 01

USA  
VM  
005

USA  
VM  
015


28

# PROCESSING OPERATIONS CONTROL OMI PLANNING SHEET








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Authorizing Document ORB517-263(ADD)		Material & Equipment: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		MICR Req'd <input type="checkbox"/> Yes <input type="checkbox"/> No		NOV 12 '01		OMRS: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
<b>PERFORM THE FOLLOWING:</b>											
<b>Pre-Ops Setups</b>											
Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps				
<b>OPS Support</b>											
Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps				
<b>Operating Instructions</b>											
Task	Seq	Steps	Task	Seq	Steps						
	150										
<b>Post Ops</b>						<b>Appendices</b>					
Task	Operation Number	Seq	Steps	Task	Seq						
						N/A					
<b>Subtask WAD's</b>											
Planner LISA RUTKOWSKI		WC 150 USA NOV 12 '01		Ext 0746		QC Closure 0490		Date DEC 14 '01		Page 2 OF 2	

# OMI TASK CLOSEOUT CHECKLIST

OMI No. <u>56444 J-02</u>	Run No. <u>1</u>	Task Control No. (TCN) <u>2921332-F/R</u>
Start Date <u>11/20/01</u>	Completion Date <u>11/30/01</u>	Closure Date <u>12/13/01</u> <small>DEC * 11</small> 

	QC/Eng.	Date
1. Deviation Index: Verify total number of deviations agree with index. Verify entry is correct into OMI.		<u>12/12/01</u>
2. Constraints List: Verify all constraints are accepted by QC or waived by Engineering. Verify that constraints list is complete and closed. <u>SUBMITTED TO GUNOT. R. Seale ETR</u>	<u>N/A</u>	<u>N/A</u>
3. IPR's: Verify that all IPR's are closed or upgraded to problem reports or dispositioned as no constraint to OMI closure and incorporated in central IPR system and a copy of the central IPR sort attached.		<u>DEC * 11</u>
4. Verify that material and equipment requirement list enclosed (if applicable).	<u>N/A</u>	
5. OMI: Verify that all pages or verification sheets are completed, stamped, and dated in the lower left/right hand corners.		<u>12/12/01</u>
6. OMI: Verify that all miscellaneous documents/procedures have sequence number referenced and stamped; e.g., photos, sample results, etc.		<u>12/12/01</u>
7. Planned task/OMI satisfactorily completed. OPR: <u>R. Seale ETR 12/12/01</u>		<u>12/12/01</u>
8. LSS review prior to closure for CIL OMI's. MMC <u>N/A</u> Thiokol <u>N/A</u>		

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## **SSV ICE AND DEBRIS ASSESSMENT**

Element/End Item: ALL  
Flow/Usage: ET-103 & SUBS  
Facility: LC 39  
Design Center Concurrence: MSFC/JSC  
Category: B  
OPR: ETM  
TTL ORG: SE

**This document contains  
HAZARDOUS operations.**

## Table of Contents:

<b>1.0 INFORMATION.....</b>	<b>1</b>
1.1 Objective.....	1
1.2 Special Instructions All Operations .....	2
1.3 Operations List .....	4
<b>2.0 SAFETY INFORMATION.....</b>	<b>5</b>
2.1 Hazards .....	5
2.2 Safety Requirements.....	5
2.4 Reference Safety Documentation .....	5
<b>3.0 STAGING REQUIREMENTS .....</b>	<b>6</b>
3.1 Referenced Engineering Documentation.....	6
3.1.2 Documents.....	6
3.2 Parts, Materials, Equipment, and Special Tools.....	6
3.2.5 Shop Support Materials.....	6
3.2.8 Personal Protective Equipment .....	7
<b>4.0 PLANNING REQUIREMENTS .....</b>	<b>8</b>
4.3 LPS Requirements .....	8
4.3.1 Computer Systems.....	8
4.4 Support Services, Commodities, and Equipment.....	8
4.4.2 Communications.....	8
4.4.3 OTV.....	8
4.4.4 Countdown Display/Status.....	9
4.4.8 Services .....	9
4.4.12 Propellants, Gases and Chemicals.....	9
<b>5.0 CONFIGURATION ACCOUNTING AND VERIFICATION .....</b>	<b>10</b>
5.1 Specific OMRS Requirements Satisfied by this TOP.....	10
5.5 List of References.....	11

## 1.0 INFORMATION

### 1.1 Objective

Provide necessary tasks that document, monitor and evaluate ice and debris conditions to eliminate or minimize debris concerns of the integrated SSV during ET tanking, FRF, launch, and associated detanking.

#### Description

1. This OMI is performed as subtask to S0007/S0014/S0037.
2. This OMI provides documentation of ice/debris activities:
  - A. Pre-launch icing briefing
  - B. Pre-launch debris inspection
  - C. Countdown - Based timeline evaluation monitoring of ET TPS surfaces using OTV
  - D. OTV monitoring of seal/flange areas for cryogenic leakage
  - E. SSV OTV monitoring for debris conditions during countdown
  - F. Cryogenic replenish inspection for evaluation of SSV and facility debris concerns or anomalies
  - G. Evaluation of concerns/anomalies in the event of ET detanking
  - H. Review of engineering film data for SSME ignition, launch, ascent, ET separation, and orbiter landing.
3. Orbiter landing debris information is contained in the NASA publication for Ice and Debris Assessment. That report is referenced in this OMI for continuity of debris data.

## **1.2 Special Instructions All Operations**

1. This OMI is run as a subtask to OMI's S0007, S0014, and S0037. All PAD clearing and controlled access operations will be performed per those OMI's.
2. Constraints will be statused by controlling OMI's S0007/S0014/S0037.
3. The OTV camera numbering scheme for PAD A/B is 0XX/1XX.
4. Task Team Leader assignment: NASA PH-H is TTL for L-20 Hour Walkdown, Final Inspection, and Post Launch/Drain Walkdown. ETM is TTL for all other operations.
5. From time stable replenish mode starts until start of final SCAN, scanning with individual cameras should be performed approximately once per hour.
6. Cameras 061/161, 063/163, and 070/170 may be released to NASA select with CICE concurrence.
7. All personnel participating in final inspection and post drain walkdown shall be current in following training:
  - A. Emergency PAD egress
  - B. Fire fighting
  - C. ELSA
8. Milestones:
  - A. MLP portion of post launch walkdown commences at approximately T + 1 hours.
  - B. PAD acreage portion of the post launch walkdown commences at approximately T + 2 hours. (may be deferred until preferred daylight hours.)
  - C. Post drain walkdown commences at approximately T + 4 hours after drain initiated (typically 1 1/2 hours after LH<sub>2</sub>/LO<sub>2</sub> low level sensors dry).
9. Hands-on investigation required for all ET-TPS defects suspected of violating NSTS 08303 ice/debris inspection criteria.
10. From time launch scrub is declared until 1.5 hours past time LH<sub>2</sub>/LO<sub>2</sub> low level sensors read dry, OTV camera scanning shall be performed approximately once per hour.

11. OTV cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171 shall be used to monitor LO<sub>2</sub>/LH<sub>2</sub> tank drain operations.
12. Excessive vapors are defined as being more severe than that described in NSTS 08303 - Ice/Debris Inspection Criteria or NSTS 16007 - Launch Commit Criteria - Hazardous Gas Subsystem.
13. Quality coverage is not required for performance of this OMI. Ref SFOC-GO0007, Ice and Debris Team Operations are exempt from quality coverage. The ROR (CTIF) performs the CMQC function for all non-hazardous operations.
14. Personnel using Sony DKC-ID1 camera shall verify lithium ion battery is securely locked in the bayonet fitting and the lithium button battery door is securely locked and taped in place.
15. Verify camera flash is deactivated.
16. Personnel using Kodak DC 50/120 camera shall verify alkaline batteries are properly installed.
17. Personnel using digital cameras shall not operate in H<sub>2</sub> leak or O<sub>2</sub> rich environment (23 percent or greater).
18. Personnel using the Sony MVC-FD91 camera shall verify the lithium ion battery is securely locked and the battery door is locked closed. Personnel shall verify that both battery doors (lithium ion and lithium button) are closed and taped shut.
19. Personnel shall verify that cameras and equipment are securely tethered when at the PAD while the SSV is present.



### 1.3 Operations List

Operation		Shop/ Cntl Rm Console	OPR	Haz (Y/N)	Duration (Hrs)
No.	Title				
10	Support Preparations	STM/ FR2	ETM	N	0.2
15	IR Camera Setup	PH-H/ NA	ETM	N	4.0
20	Ice Prediction Briefing	SE/ NA	ETM	N	0.5
30	Pre-launch Walkdown	SE/ NA	ETM	N	2.0
40	Ice Frost Debris Console Initial Configuration Setup	SE/ FR2	ETM	N	3.0
50	SSV Debris Assessment	SE/ FR2	ETM	N	18.0
60	Group 1 Monitoring LO2 Chill Down Thru T-0	SE/ FR2	ETM	N	15.0
70	Group 2 Monitoring - LH2 Chill Down Thru T-0	SE/ FR2	ETM	N	15.0
80	Final Inspection	SE/ FR2	ETM	Y	3.0
90	LO2/LH2 Drain Monitoring	SE/ FR2	ETM	N	4.0
100	Console Securing	SE/ FR2	ETM	N	0.5
110	Summary Tape	SE/ FR2	ETM	N	18.0
120	Post Drain Walkdown	SE/ NA	ETM	Y	2.0
130	Post Launch Walkdown	SE/ NA	ETM	Y	3.0
140	Film Review	SE/ NA	ETM	N	15.0
145	IR Camera Removal	PH-H/ NA	ETM	N	2.0
150	Final Report	SE/ NA	ETM	N	0.5

## 2.0 SAFETY INFORMATION

### 2.1 Hazards

#### Operation

1. Working at unprotected heights.
2. Walkdown at PAD while SSV is in stable replenish mode.

### 2.2 Safety Requirements

#### Operation

1. If lightning activity is forecast to be within 5 miles of launch PAD, CTC and SFOC safety shall implement provisions of adverse/severe weather and lightning policy contained in GSOP 5400 Ground Safety Operations Procedures.
2. There are no safing/shutdown or evacuation steps required in this OMI.
3. Hazardous operations within this subtask OMI will not be started until safety concurrence to proceed has been given per the integrated OMI controlling this subtask.

### 2.4 Reference Safety Documentation

Number	Rev	Title
KHB 1710.2	LI	KSC Safety Practices Handbook
GSOP 5400	LI	Ground Safety Operating Procedures

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### 3.0 STAGING REQUIREMENTS

#### 3.1 Referenced Engineering Documentation

##### 3.1.2 Documents

###### OPERATION 120

Document No.	Rev	Title
NSTS 08303	(LI)	NSTS PROGRAM ICE/DEBRIS INSPECTION CRITERIA

#### 3.2 Parts, Materials, Equipment, and Special Tools

##### 3.2.5 Shop Support Materials

###### OPERATION 15

Part No./Find No.	Nomenclature	Qty	Unit
8305-00-519-3144	Rymple cloth	2	roll
6810-00-543-7915	Isopropyl alcohol	8	ounces

###### OPERATION 145

Part No./Find No.	Nomenclature	Qty	Unit
8305-00-519-3144	Rymple cloth	2	roll
6810-00-543-7915	Isopropyl alcohol	8	ounces
6505-00-133-8025	Petroleum Jelly, Vaseline (or equivalent)	1	tube/jar

### 3.2.8 Personal Protective Equipment

<b>OPERATION 15</b>	<b>Nomenclature</b> N-Dex nitril gloves chemical splash goggles face shield
<b>OPERATION 30</b>	<b>Nomenclature</b> safety harness lanyard
<b>OPERATION 80</b>	<b>Nomenclature</b> safety harness lanyard Nomex coveralls with gloves and hoods ELSA
<b>OPERATION 120</b>	<b>Nomenclature</b> safety harness lanyard hardhats flame retardant coveralls
<b>OPERATION 130</b>	<b>Nomenclature</b> safety harness lanyard hardhats flame retardant coveralls
<b>OPERATION 145</b>	<b>Nomenclature</b> N-Dex nitril gloves chemical splash goggles face shield

## **4.0 PLANNING REQUIREMENTS**

OIR Required Yes [ ], No [ X ]

### **4.3 LPS Requirements**

#### **4.3.1 Computer Systems**

PC GOAL  
CCMS Configuration  
CDS  
CMS

### **4.4 Support Services, Commodities, and Equipment**

#### **4.4.2 Communications**

(Per controlling OMI S0007, S0014 or S0037 unless specified otherwise)

#### **4.4.3 OTV**

(Per controlling OMI S0007, S0014 or S0037 unless specified otherwise)

**OTV Cameras required:** 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171

**OTV Cameras to be recorded:** 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171

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#### 4.4.4 Countdown Display/Status

<u>Display Required</u>	<u>Bldg</u>	<u>Room</u>	<u>Operation Time</u>
Timing	LCC	FR2	Duration of Test
Countdown and GMT	LCC	FR2	Duration of Test

#### 4.4.8 Services

<u>Service/Special Requirements</u>	<u>Location</u>	<u>Purpose</u>
SFOC Safety	LC-39 A&B	Safety Support
ELSA'S (8)	LC-39 A&B	Inspection Team Use
Radio Net 105	LC-39 A&B	Inspection Team Use

#### 4.4.12 Propellants, Gases and Chemicals

<u>Commodity</u>	<u>Spec No.</u>	<u>Quantity</u>	<u>Rev</u>	<u>Location</u>	<u>Minimum Press</u>	<u>Delivery Time</u>
GN <sub>2</sub>	SES-0073	Min 750	PH-H	Pad 39B	3000 PSI	1 week
	-6.3-5	Cu ft	861-3645	Camera Site 2		prior to T-0

## 5.0 CONFIGURATION ACCOUNTING AND VERIFICATION

### 5.1 Specific OMRS Requirements Satisfied by this TOP

OMRS NO.	NOMENCLATURE/ EFFECTIVITY	SEQ-STEP (CAP)
S00E00.021	ET TPS MON DURING DETANK TAF;C	90-005
S00E00.031	POST DETANK ET TPS INSPECT TAF;C	120-002
S00FA0.900	PRELAUNCH WEATHER BRIEFING (L-1 DAY) VAF1-90	20-001
S00FB0.005 (1 )	ET TPS SURFACE MONITORING T23,27-29,31-999	50-022
S00FB0.350 (1 )	MONITOR GO2 VENT HOOD VAF1-90	50-024
S00FB0.360 (1 )	MONITOR ET/ORB MPS FOR LEAKAGE VAF1-90	50-022
S00L00.150	HIGH WIND ET NOSE INSPECTION SAF;C	50-020
S00U00.010 (1 )	POST LAUNCH SHUTTLE/PAD AREA INSPECTION SAF1-999	130-002
S00U00.011 (1 )	ENGR REVIEW & ANALYSIS OF LAUNCH FILM SAF1-999	140-001
S00U00.020-A (1 )	AN ENGINEERING PAD INSPECTION TEAM SAF1-999	80-002
S00U00.020-C (1 )	INSPECT ORBITER AFT ENGINE SAF1-999	80-002
S00U00.020-D (1 )	INFRARED SURVEILLANCE SAF1-999	80-002
S00U00.030 (1 )	PRELAUNCH SHUTTLE/PAD AREA INSPECTION SAF1-999	30-001

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## **5.5 List of References**

### **OPERATION 20**

<b>Reference No.</b>	<b>Rev</b>	<b>Title</b>
NSTS 16007	(LI)	NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem and Appendix F

### **OPERATION 30**

<b>Reference No.</b>	<b>Rev</b>	<b>Title</b>
80901019010	(LI)	ET Post Build Acceptance and In-Process Rework Requirements Manual - Offsite

### **OPERATION 40**

<b>Reference No.</b>	<b>Rev</b>	<b>Title</b>
79K24576	(LI)	OTV System Installation, LC 39, Pad A
79K24522	(LI)	OTV System Installation, LC 39, Pad B

### **OPERATION 50**

<b>Reference No.</b>	<b>Rev</b>	<b>Title</b>
SPI SP-519	(LI)	OMI and OM Implementation
SFOC GO0007	(LI)	Quality Planning Requirements Document (QPRD)



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## **OPERATION 10 Support Preparations**

Shop: **STM**  
Cntrl Rm Console: **FR2**  
OPR: **ETM**  
Zone: **NA**  
Hazard (Y/N): **N**  
Duration (Hrs): **0.2**

**10-1 STM JYVO 138**

**Verify** PAD OTV system is configured to support S6444 as scheduled.

Support: **COMM**

**10-2 STM JSTC 111**  
**JSTC \*SCB 114**

**Verify** eight 10-minute ELSA's available at complex J for use by Final Inspection Team (ref S0007/S0014/S0037).

Support: **LS**

**10-3 STM TBC 136**

Operation - Support Preparations complete.

**\*\*\* End of Operation 10 \*\*\***

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## OPERATION 15 IR Camera Setup

Shop: PH-H  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 4.0

### WARNING

Hard hats required on the Pad when SSV is not present.

### CAUTION

Exercise care to avoid dropping equipment, fasteners, etc from RSS Roof to prevent damage to equipment or injury to personnel. All tools must be tethered.

### NOTE

IR Camera installation at RSS Roof site may be not performed if IR Camera already installed or if technical concerns preclude such.

#### 15-1 Install IR camera at RSS Roof Site as follows.

1. **Rotate** camera housing back cover to open position by removing bolts with flat washers (20 pl). **Retain** bolts/washers for reinstallation.
2. **Remove** camera housing front cover by removing fasteners (2 pl). **Reinstall** fasteners after cover removal. **Retain** cover for reinstallation after IR Camera Unit removal.
3. **Install** IR Camera Unit into camera housing. **Secure** IR Camera Unit in housing by locking spring pin at lower, left.

**WARNING**

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

**CAUTION**

Do NOT allow opened back cover to exert undue force on cables once cables have been connected.

4. **Connect:**
  - OTV coaxial cable
  - Pan & tilt cable
  - Controller cable
  - Power cable
5. **Rotate** camera housing back cover into closed position. **Secure** back cover by installing bolts/flat washers (20 pl). **Tighten** bolts wrench tight.

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**WARNING**

**Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system.** Ensure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear **N-Dex nitril gloves** and **chemical splash goggles**. When working at eye level or above wear a **face shield** over goggles.

WS002.a 05-22-01

6. **Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl alcohol.
7. **Perform** functional checkout of IR Camera Unit using local controller if required at Task Team Leader (TTL) discretion.

Sub Step Not Performed:

ET  
01

11/26/01

NASA PH-H

*[Signature]*

Date 11-26-01

USA ETM

*[Signature]*

Date 11/26/01

Not Performed: N/A

ET  
01

11/26/01

**NOTE**

IR Camera installation at Camera Site 2 may be not performed if IR Camera already installed or if technical concerns preclude such.

**15-2 Install IR camera at Camera Site 2 as follows.**

1. **Rotate** camera housing back cover to open position by removing eight ea bolts using Phillips screwdriver. **Retain** bolts/washers for reinstallation.
2. **Remove** camera housing front cover by removing securing bolt(s). **Reinstall** bolt(s) after cover removal. **Retain** cover for reinstallation after IR Camera Unit removal.
3. **Install** IR Camera Unit into camera housing. **Secure** IR Camera Unit in housing by tightening set screw(s) wrench tight at lower left/right.

**WARNING**

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

4. **Connect:**
  - OTV coaxial cable
  - Pan & tilt cable
  - Controller cable (2 pl)
  - Power cable
5. **Rotate** camera housing back cover into closed position. **Secure** back cover by installing bolts (8 pl). **Tighten** bolts using Phillips screwdriver.

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APPROVED

**WARNING**

**Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system.** Ensure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear **N-Dex nitril gloves** and **chemical splash goggles**. When working at eye level or above wear a **face shield** over goggles.

WS002.a 05-22-01

6. **Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl alcohol .
7. **Perform** functional checkout of IR Camera Unit using local controller if required at Task Team Leader (TTL) discretion.

Sub Step Not Performed: W.R. Richards II

NASA PH-H W.R. Richards II

Date 11-21-01

USA ETM W.R. Richards II

Date 11-21-01

Not Performed: N/A

\*\*\* End of Operation 15 \*\*\*

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## OPERATION 20 Ice Prediction Briefing

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.5

### NOTE

Ref: NSTS 16007 (LI) NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem and Appendix F defines the ET No-Ice Zone.

#### 20-1 CICE

**Conduct** L-1 day ice prediction briefing with launch director.

PH-H Signature

*[Handwritten Signature]* <sup>Folk</sup>  
11/28/01  
A. OLIN

OMRSD S00FA0.900 <sup>56A</sup><sub>075</sub>

#### 20-2 Operation - Ice Prediction Briefing complete.

\*\*\* End of Operation 20 \*\*\*

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### OPERATION 30 Pre-launch Walkdown

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: PAD  
Hazard (Y/N): N  
Duration (Hrs): 2.0

#### WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

#### NOTE

This operation is performed at approximately L-20 hours. When this operation is performed in support of a 24 hour scrub turnaround, the preceding launch scrub post drain walkdown and this pre-launch walkdown may be performed concurrently.

Inspections may also be performed from the RSS, GO<sub>2</sub> Vent Arm (GVA), -Y OWP, or +Y OWP if still extended and accessible.

Ref: 80901019010 (LI) ET Post Build Acceptance and In-Process Rework Requirements Manual - Offsite

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are optional walkdown participants.

NASA Engr	(4)
SFOC Engr	(2)
LMSSC - LSS	(1)
Boeing - LSS	(1)
SRB ELE	(1)
Thiokol - LSS	(1)



30-1 Debris inspection team **perform** walkdown of SSV and MLP per following:

1. Team leader **verify** S6444 pre-test briefing complete.
2. **Assemble** following essential personnel  
  
NASA PH-H Engineering - 1  
SFOC ETM Engineering - 1
3. **Inspect** following areas (as a minimum) from the MLP, RSS and FSS to identify/ resolve potential debris sources.

Areas to be inspected

- A. Launch vehicle external surfaces
  - Orbiter
  - SRB's
  - External Tank
- B. MLP surfaces
  - LH and RH SRB holddown posts
  - Deck including deck bolts, fixtures, and edge gutters
  - SSME LH and RH SRB exhaust openings, and sound suppression (SS) troughs
  - TSM's and camera housings
4. Ref Table 30-1, **document** and SIM Photograph SSV and Launch PAD Configuration.

Description: Pre launch walkdown.

OMRSD S00U00.030-1 <sup>5/5</sup><sub>3/3</sub>

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APPROVED

OMI S6444 J02  
APPROVED

- 30-2 **Record** all facility discrepancies in S0007. Submit copy to PAD leader and **notify** TBC/CTC. **Verify** no constraints to continue.

PH-H

*[Signature]* Date 11/28/01

ETM

*[Signature]* Date 11/28/01

- 30-3 Operation - Pre-launch Walkdown complete.

30-3

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Table 30-1 Photo Requirements for SSV and Launch Pad Configuration			
Photos from MLP			
<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
ET -Z	Vertical	28 mm	
Aft Dome	Horizontal	28 mm	
Aft Dome	Horizontal	35-70 mm	
LH SRB from North	Horizontal	35-70 mm	All water troughs in view
LH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
LH SRB from East	Vertical	35-70 mm	
RH SRB from North	Horizontal	35-70 mm	All water troughs in view
RH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
RH SRB from West	Vertical	35-70 mm	
SRB Heater Elec T-0	Horizontal	35-70 mm	Foam intrusion; May need flash
North HDP	Vertical	35-70 mm	Representative view
South HDP	Vertical	35-70 mm	Representative view
TSM T-0 LH <sub>2</sub>	Vertical	35-70 mm	Flash needed
TSM T-0 LO <sub>2</sub>	Vertical	35-70 mm	Flash needed
Orbiter Left & Right Wing	Vertical	35-70 mm	From below ET (1 Photo each wing)

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APPROVED

OMI S6444 J02  
APPROVED

### 135 Ft Level Photos

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LO <sub>2</sub> UMB	Vertical	35-70 mm	From OWP usually during T5401
LH <sub>2</sub> UMB	Vertical	35-70 mm	From OWP usually during T5401

### 215 Ft Level Photos

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
ET surfaces from FSS	Vertical	35-70 mm	
LH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
RH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
Jack Pad C/O's	Horizontal	35-70 mm	Flash needed (1 each C/O)
LO <sub>2</sub> Ogive Cable Tray	Vertical	35-70 mm	From RSS roof

### 255 Ft Level Photos

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
ET surfaces with GO <sub>2</sub> vent ducts in view	Vertical	35-70 mm	
GO <sub>2</sub> vent ducts	Horizontal	250 mm	

\*\*\* End of Table 30-2 Photo Requirements for SSV and Launch Pad Configuration

\*\*\* End of Operation 30 \*\*\*

## OPERATION 40 Ice Frost Debris Console Initial Configuration Setup

Shop: SE

Cntrl Rm Console: FR2

OPR: ETM

Zone: NA

Hazard (Y/N): N

Duration (Hrs): 3.0

### NOTE

The next step sets up the photo processing laptop for use in the Firing Room. This is not a constraint to set up of the console or to final inspection team operations. Network or equipment failures on the photo processing machine shall be annotated below.

#### 40-1 Configure computer to perform image processing, analysis, and recording:

1. **Connect** following equipment at Ice/Frost console:
  - power cable to computer
  - "Dazzle" capture card to laptop parallel port
  - "Y" adapter to laptop PS2 port
  - keyboard to keyboard port on "Y" adapter
  - mouse to mouse port on "Y" adapter
  - monitor to laptop
2. **Insert** Xircon Network Card into Personal Computer PCMCIA port.
3. **Connect** ethernet (gray) cord to Xircon Network Card.
4. **Remove** terminator from video cable.
5. **Plug** BNC-to-RCA adapter into end of video cable.
6. **Plug** video cable into "Dazzle" DVC "video in".
7. **Power-up** Trouble Console VCR.

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

8. Log-on to KSC Ground Ops. Click-on Start/Programs/Dazzle.
9. Confirm above equipment as operational and record results.

Results NOMINAL

ETM Na KAT 11/20/01

**NOTE**

The next step verifies the setup of the infrared scanners. This is not a constraint to set up of the ice console. IR scanner condition shall be annotated below.

- 40-2 Verify IR scanner operation condition, annotate below.

RSS: OK

CS 2: OK

**NOTE**

The next step verifies the operation of console monitors in the Firing Room. This is not a constraint to set up of the console or to final inspection team operations. Equipment condition shall be annotated below.

- 40-3 Verify console condition by powering on monitors and tape recorders.

Monitors: OK

Tape recorders: OK

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01

11/29/01

**NOTE**

ET OTV pre-mapping/initial position of cameras may be performed in random order.

Ref: 79K24576 (LI) OTV System Installation, LC 39, Pad A and

Ref: 79K24522 (LI) OTV System Installation, LC 39, Pad B define OTV camera locations.

FOV designates field-of view. RSS and -Y OWP must be retracted for completion of pre-mapping.

Pre-mapping steps/substeps in the remainder of this operation need not be performed if supporting a scrub turnaround and if performed during a previous run.

It is preferred to record all pre-mapping scanning on a single tape. However, multiple tapes may be used when lighting/ launch countdown constraints necessitate such.

40-4 CVM1 JTV1 223

**Perform** OTV pre-mapping of External Tank exterior surfaces using OTV Cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, and 067/167 as follows:

- **Insert** designated pre-map tape into trouble console VCR.
- **Punch-up** camera number on trouble monitor.
- **Start** recording on pre-map tape. **Record** start time (GMT).
- **Scan** from top-to-bottom, left-to-right and right-to-left at approximately full zoom-in.
- **Stop** recording on pre-map tape. **Record** stop time (GMT).
- **Record** data in Table 40-1.
- **Repeat** with each OTV camera listed until each has been used to scan the External Tank.
- **Remove** pre-map tape from trouble console VCR.

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R. BREWER

Date 11/29/01

Not Performed: N/A

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APPROVED

OMI S6444 J02  
APPROVED

40-5 CVM1 JTV1 223

**Position** OTV Cameras 004/104, 009/109, 013/113, 033/133, 042/142,  
054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164,  
065/165, 066/166, 067/167, 070/170, and 071/171 to initial positions as  
defined in Table 40-2.

ETM R. Seave Date 11/29/01

Not Performed: NA

ET  
01

11/29/01



09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

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21 11/29/01

Table 40-1 ET Pre-Mapping Data		Tape # <sup>169A</sup> <sup>170A</sup>
OTV Camera	Start Time (GMT)	Stop Time (GMT)
004 / 104	12:50	12:59
009 / 109	12:48	12:56
013 / 113	12:29	12:36
033 / 133	12:37	12:42
042 / 142	12:56	<del>12:56</del> 13:04
054 / 154	12:42	12:48
055 / 155	12:12	12:18
056 / 156	12:18	12:26
060 / 160	11:50	12:01
061 / 161	12:03	12:06
062 / 162	12:07	12:22
063 / 163	11:54	12:08
064 / 164	12:26	<del>12:26</del> 12:40
065 / 165	12:08	12:12
066 / 166	12:23	12:29
067 / 167	12:40	12:48

Notes: All scans / cameras Nominal.

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Table 40-2 OTV Camera Initial Positions	
OTV Camera	Initial Position
004 / 104	FOV centered on GUCP
009 / 109	FOV on LH <sub>2</sub> Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 063/163 and 064/164.
013 / 113	Full zoom in. View SW GO <sub>2</sub> Vent Louver area.
033 / 133	FOV perpendicular to ET and with LO <sub>2</sub> -to-Intertank splice at frame top and LH <sub>2</sub> -to-Intertank splice at frame bottom. Then tilt down until XT2058 is in frame center.
042 / 142	FOV centered on Orbiter Access Arm-to-Orbiter interface.
054 / 154	FOV to encompass approximately 3 feet forward of XT2058 to 2 feet aft of XT2058. Orbiter wing and SRB should be in view at frame left.
055 / 155	Set FOV on north bridge LH <sub>2</sub> pipeline flange.
056 / 156	FOV with LH <sub>2</sub> Aft Dome in frame bottom and XT2058 in view at frame top.
060 / 160	Full zoom in. View SW GO <sub>2</sub> Vent Louver area.
061 / 161	Full zoom-in. Adjust FOV until ET LO <sub>2</sub> -to-Intertank splice is centered vertically and view is perpendicular to ET. Pan right until edge of the ET comes into view. Note: LO <sub>2</sub> Tank may pass out-of-view.
062 / 162	Full zoom in. View NW GO <sub>2</sub> Vent Louver area.
063 / 163	FOV on LH <sub>2</sub> Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 009/109 and 064/164.
064 / 164	FOV on LH <sub>2</sub> Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 009/109 and 063/163.
065 / 165	Full zoom out. Set FOV on aft part of ET with frame bottom approximately 2 feet below LH <sub>2</sub> Aft Dome.
066 / 166	FOV perpendicular to ET with LO <sub>2</sub> -to-Intertank splice at frame top. Then tilt down until Orbiter RH Wing/SRB intersection is in frame lower right.
067 / 167	Set FOV with LH <sub>2</sub> Aft Dome toward frame bottom and 2 <sup>nd</sup> black ring of SRB in view.
070 / 170	Select down wind camera of these two as wide angle view of the SSV.
071 / 171	Set up wind camera for close-up view of SSME's.

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

40-6 Operation - Ice Frost Debris Console Initial Configuration Setup complete.

ETM 

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 Date 11/29/01

\*\*\* End of Operation 40 \*\*\*

40-7

ET
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

## OPERATION 50 SSV Debris Assessment

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 18.0

### NOTE

Steps in this operation are contingent upon progression of launch countdown operations and may not be performed if countdown is terminated.

Entire Operation Not Performed: N/A

### NOTE

Until otherwise indicated, all times are referenced to S0007, S0014 or S0037 timelines.

No operations/steps within this subtask OMI may be performed as a stand-alone procedure. This OMI may only be performed as a subtask to S0007/S0014/S0037.

### NOTE

Ref: SPI SP-519 (LI) OMI and OM Implementation and Ref: SFOC GO0007 (LI) Quality Planning Requirements Document (QPRD), following step complies with requirements for ROR-as-CMQC function.

50-1

CTIF    TBC  
TBC    CMQC   136

Notify TBC that CTIF will perform the CMQC function for STS 108, S6444 run 1. Request TBC notify CMQC that the ROR-as-CMQC option will be exercised for STS 108, S6444 run 1.

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

50-2

CTC	TBC	232
TBC	CTIF	136

Perform OTV and ice/frost monitoring area setups.

ETM D. Sosa Date 11/29/01

50-3

CTIF	TBC	136
TBC	CTC	
CTC	STM	232

Verify Operation 10- Support Preparations complete.

ETM D. Sosa Date 11/29/01

50-4

CTIF

Verify Operation 20 - Ice Prediction Briefing and Operation 30- Pre-launch Walkdown complete.

ETM D. Sosa Date 11/29/01

ET  
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11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

50-5

CTIF CVM1 222  
CVM1 222

Verify:

- All OTV cameras are on, tapes in recorder, and ready to commence OTV scanning, monitoring, and recording.
- Trouble tape recorder is ready.
- Ice Frost Debris Console Initial Configuration Setup complete.

ETM R. Sca Date 11/29/01

50-6

CTIF CICE 222  
CVM1  
CVM2  
CIPC  
CTIF JYVR 138  
CVM1 JTV1 223  
CVM2 JTV2 225

All personnel participating in OTV operations **report** test ready status.

ETM R. Sca Date 11/29/01

Support: COMM

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

50-7

CTIF	TBC	136
TBC	CTC	232

Ice Frost Console Area Setups for OTV scanning complete.  
**Report** readiness.

ETM D. Seale Date 11/29/01

Not Performed: N/A

50-8

CTIF CVM1 222

From start of LO<sub>2</sub> chilldown until seal deflation/GO<sub>2</sub> vent hood retraction, **monitor** the +Y/-Y GO<sub>2</sub> vent seal-to-ET interface for seal fretting and continuous GO<sub>2</sub> escape.

OMRS S00FB0.350-1

ETM N/A Date N/A

Not Performed: 

ET
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11/29/01

ET
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11/29/01

50-4

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

**NOTE**

GO<sub>2</sub> vent seal fretting could induce damage to ET SOFI. Continuous GO<sub>2</sub> venting could result in formation of ice in the no ice zone (ref NSTS 16007). Ultimate decision to lift the vent hood rests with CMEC.

50-9

CTIF TBC 136  
CMEC

If +Y/-Y GO<sub>2</sub> vent seal fretting or continuous GO<sub>2</sub> escape detected from start of LO<sub>2</sub> chilldown until seal deflation, **notify** CMEC for GO<sub>2</sub> vent hood removal.

ETM N/A Date 11/29/01

Not Performed: ET  
01  
11/29/01

50-10

CTIF CIPC 222

**Monitor** wind speed and direction from start of LO<sub>2</sub>/LH<sub>2</sub> chill down through launch/scrub. CIPC **notify** CTIF if winds measured at 38 knots or greater from North +/-30 degrees as measured at 60 feet.

ETM N/A Date 11/29/01

Not Performed: ET  
01  
11/29/01

① 2nd ETE  
P. Seale ETM 11/29/01



09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

**NOTE**

Excessive vapors are defined as being more severe than those described in NSTS 08303 (LI) NSTS Program Ice/Debris Inspection Criteria or NSTS 16007 (LI) NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem.

50-11

CTIF CVM1 222  
CVM2

From start of LO<sub>2</sub>/LH<sub>2</sub> loading until Prepressurization  
(LO<sub>2</sub> at T-2M55s and LH<sub>2</sub> at T-1M57s):

1. **Monitor** following ET-Orbiter MPS areas for leakage:
  - LO<sub>2</sub> Feedline (portion external to the Intertank)
  - LH<sub>2</sub> Feedline
  - LH<sub>2</sub> Recirculation Line
  - LH<sub>2</sub> Aft Dome Manhole Cover(s)
  - ET-Orbiter LO<sub>2</sub>/LH<sub>2</sub> Umbilical Disconnects
  - LH<sub>2</sub> T-0 Umbilical
  - LO<sub>2</sub> T-0 Umbilical

2. **Verify** no visible cryogenic liquid or excessive vapors.

OMRS S00FB0.360-1

ETM N/A Date N/A

Not Performed:

ET  
01

11/29/01

ET  
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

50-12

CTIF CVM1 222  
CVM2

**Monitor** and **videotape** following ET TPS surface areas and GO<sub>2</sub> Vent Area during LO<sub>2</sub>/LH<sub>2</sub> loading through Prepressurization (LO<sub>2</sub> at T-2M55s and LH<sub>2</sub> at T-1M57s):

- LH<sub>2</sub> Aft Dome
- LH<sub>2</sub> Barrel
- Intertank (external)
- LO<sub>2</sub> Tank
- GO<sub>2</sub> Vent Area
- Protuberances

OMRS S00FB0.005-1

ETM N/A Date N/A

Not Performed:

ET  
01

11/29/01

50-13

CTIF CVM1 222

**Perform** Operation 60 - Group 1 Monitoring.

ETM N/A Date N/A

Not Performed:

ET  
01

11/29/01

50-7

ET  
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

50-14

CTIF CVM2 222

Perform Operation 70 - Group 2 Monitoring.

ETM N/A Date N/A

Not Performed: 

ET
01

  
11/29/01

50-15

CTIF CVM2 222

Once per hour minimum, after start of LO<sub>2</sub>/LH<sub>2</sub> (until LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry), scan LO<sub>2</sub> feed line brackets and flange closeouts per Table 50-1.

ETM N/A Date N/A

Not Performed: 

ET
01

  
11/29/01

ET
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

50-16

CTIF CICE 222

As count proceeds, for concerns/ observations identified:

1. **Record** observation/concern on trouble tape per Table 50-1.
2. **Document** observed condition on Table 50-2, Observation Worksheet.

ETM N/A Date N/A

Not Performed:



11/29/01

50-17

TBC CTIF 136  
CTIF CICE 222

**Perform** Operation 80 - Final Inspection when called by  
S0007/S0014/S0037.

ETM N/A Date N/A

Not Performed:



11/29/01

50-9



11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

**NOTE**

Final SSV scan typically commences at L-2 hours.

50-18

CTIF CVM1 222  
CVM2

Perform final SSV scan.

ETM N/A Date N/A

Not Performed: 11/29/01

50-19

CTIF CVM1 222  
CVM2

At start of T-9 minute hold, **configure** OTV cameras for terminal count.

ETM N/A Date N/A

Not Performed: 11/29/01

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100Y 28 01  
50  
CT  
See Dev  
ET 01  
11/29/01

ET 01  
11/29/01

50-10

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

50-20

If winds are from the north (+/-30 degrees) and are 38 knots (peak as measured at 60 feet above ground) or greater:

1. **Monitor/videotape** nose cone area during high winds.

2. **Verify:**

A. No ice formation on the +Y and -Y GO<sub>2</sub> vent seal footprint areas.

B. No damage to the ET TPS at the +Y and -Y GO<sub>2</sub> vent seal footprint areas.

C. No damage to the +Y and -Y GO<sub>2</sub> vent seals themselves.

D. No evidence of GO<sub>2</sub> leakage from +Y/-Y GO<sub>2</sub> vent seals to ET interface.

USA  
VM  
075

OMRSD S00L00.150

ETM N/A Date N/A

Not Performed: 

50-21

CTIF

**Verify** launch or launch scrub (drain back). **Record** data.

Launch N/A Scrub N/A

LAUNCH DELAYED  
DUE TO ISS  
HATCH PROBLEMS.  
CRYO LOAD NEVER  
INITIATED.

Date N/A Time N/A GMT

Scrub at T- 6H

ETM R. Sca Date 11/29/01

ETM 11/29/01

50-11



09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

50-22

CTIF

ET-Orbiter MPS monitoring for leakage and ET TPS Surface Areas  
and GO<sub>2</sub> Vent Area monitoring/recording for launch complete.

OMRSD S00FB0.005-1  
OMRSD S00FB0.360-1

ETM N/A Date N/A

Not Performed:

ET  
01

11/29/01

NOTE

When completely filled and drain is initiated, it takes approximately 1 hour until the LH<sub>2</sub> tank low level sensors read dry, and approximately 1.5 hours until the LO<sub>2</sub> tank low level sensors read dry.

50-23

CTIF CVM1 222  
CVM2

If launch scrubbed (or drain back declared) after start of LO<sub>2</sub>/LH<sub>2</sub>  
slow fill mode:

- **Perform** Operation 90 - LO<sub>2</sub>/LH<sub>2</sub> Drain Monitoring.
- **Record** observations/concerns on trouble tape per Table 50-1.
- **Document** all observations/concerns on Table 50-2 Observation Worksheet.

ETM N/A Date N/A

Not Performed:

ET  
01

11/29/01

ET  
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

50-24 CTIF

GO<sub>2</sub> Vent seal to ET interface monitoring for seal fretting and continuous  
GO<sub>2</sub> escape complete.

USA  
VIA  
075

OMRSD S00FB0.350-1

ETM N/A Date N/A

Not Performed: ET  
01

11/29/01

50-25

CTIF CVM1 222  
CVM2

Terminate scanning operations.

ETM D. Sosa Date 11/29/01

50-26

CTIF CVM1 222  
CVM2

Perform Operation 100 - Console Securing.

ETM D. Sosa Date 11/29/01

50-27

CTIF

If LO<sub>2</sub>/LH<sub>2</sub> tanking started, **perform** Operation 110 - Summary  
Tape.

ETM N/A Date N/A

Not Performed: ET  
01

11/29/01

50-13

ET  
01



09-01-2001  
APPROVED


OMI S6444 J02  
APPROVED

**NOTE**

Following step may be not performed at CTIF discretion.

50-28      CTIF      TBC      136  
             TBC      STM

If Post Drain Walkdown to occur at night, **request** PAD xenon lighting be maintained/activated for duration of walkdown.

Not Performed: 

11/29/01

**NOTE**

Post drain walkdown typically commences approximately 1.5 hours after LH<sub>2</sub>/LO<sub>2</sub> low level sensors read dry.

50-29

**CTIF**

If launch scrubbed after start of LO<sub>2</sub>/LH<sub>2</sub> tanking, **perform** Operation 120 - Post-Drain Walkdown.

ETM N/A Date N/A

Not Performed: 

11/29/01

50-30

**CTIF**

If launch occurred, **perform** Operation 130 - Post launch Walkdown.

ETM N/A Date N/A

Not Performed: 

11/29/01

  
11/29/01

09-01-2001  
APPROVED


OMI S6444 J02  
APPROVED

50-31

CTIF

If launch occurred, **perform** Operation 140 - Film Review.

ETM N/A Date N/A

Not Performed: 

11/29/01

50-32

SSV Debris Assessment complete.

OMI S6444 J02  
APPROVED

1.	CTIF	CVM1	222	Locate anomaly/concern on pertinent OTV(s)
2.	CTIF	CVM2		Punch-up pertinent OTV on trouble monitor. Update trouble tape log in table below.
3.	CTIF			Start the trouble tape.

Trouble tape shall be allowed to run until sufficient OTV documentation of observation/concern has been made. OK to change OTV's while trouble tape is running.

- ## TROUBLE TAPE LOG

## TROUBLE TAPE LOG

### Table 50-1 Observation Documentation Procedure

[illegible]

\*\*\* End of Table 50-1 Observation Documentation Procedure \*\*\*

09-01-2001  
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Table 50-2 Observation Worksheet

**OBSERVATION DOCUMENTATION**

**Record following information for condition observed:**

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

Table 50-2 Observation Worksheet

**OBSERVATION DOCUMENTATION**

**Record following information for condition observed:**

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

11/29/01

09-01-2001  
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OMI S6444 J02  
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Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_



09-01-2001  
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OMI S6444 J02  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

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Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_



11/29/01

09-01-2001  
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Table 50-2 Observation Worksheet

**OBSERVATION DOCUMENTATION**

**Record following information for condition observed:**

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

ET  
01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

\*\*\* End of Table 50-2 Observation Worksheet \*\*\*

\*\*\* End of Operation 50 \*\*\*

09-01-2001  
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OMI S6444 J02  
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## OPERATION 60 Group 1 Monitoring LO<sub>2</sub> Chill Down Thru T-0

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 15.0

### NOTE

Do not perform this operation if launch scrub declared before LO<sub>2</sub> Chill Down commences.

Operation Not Performed:

ET  
01

11/29/01

### NOTE

This operation monitors LO<sub>2</sub> Ogive and Barrel and associated components/ areas from start of Chill Down through T-0 via OTV cameras 013/113, 060/160, 061/161, 062/162, 063/163 and 064/164.

OTV cameras 013/113 and/or 062/162 will view -Y GO<sub>2</sub> Vent Hood Seal at all times. At no time will both cameras be positioned away from the -Y GO<sub>2</sub> Vent Hood Seal.

OTV cameras 068/168 and 069/169 view SW and NE GO<sub>2</sub> Vent Areas respectively. These are fixed FOV cameras and do not have pan, tilt, etc. capability.

Steps in this operation are contingent upon progression of launch countdown operations and may be not performed if countdown is terminated.

ET  
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

### LO<sub>2</sub> Chill Down To L-2 Hour Mark

60-1 CVM1 JYVR 138

At start of vehicle LO<sub>2</sub> Chill Down, **start** recorders for cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

60-2 Record LO<sub>2</sub> MPS Chill Down start date and time (GMT).

LO<sub>2</sub> MPS Chill Down Date \_\_\_\_\_ GMT Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

60-3 CVM1 JTV1 223

From start of LO<sub>2</sub> Chill Down until start of LO<sub>2</sub> Fast Fill on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169 **monitor/videotape** ET-TPS surfaces. No cryogenic liquid or excessive vapors allowed.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

Not Performed: \_\_\_\_\_

ET  
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

~~60-4~~ **Record** LO<sub>2</sub> Slow Fill start date and time (GMT).

~~LO<sub>2</sub> Slow Fill Date\_\_\_\_\_ GMT Time\_\_\_\_\_ GMT~~

~~ETM\_\_\_\_\_ Date\_\_\_\_\_~~

~~Not Performed:\_\_\_\_\_~~

~~60-5~~ **Record** LO<sub>2</sub> Fast Fill start date and time (GMT).

~~LO<sub>2</sub> Fast Fill Date\_\_\_\_\_ GMT Time\_\_\_\_\_ GMT~~

~~ETM\_\_\_\_\_ Date\_\_\_\_\_~~

~~Not Performed:\_\_\_\_\_~~

~~60-6~~ **CVM1 JTV1 223**

~~From start of LO<sub>2</sub> Fast Fill until LO<sub>2</sub> stable replenish mode is established,  
**monitor/videotape** ET-TPS surfaces on OTV cameras 004/104, 013/113,  
060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169. **Scan**  
LO<sub>2</sub> Tank. **Alternate** cameras and **scan** from Intertank to LO<sub>2</sub> Barrel Splice to  
GO<sub>2</sub> Vent Hood. No cryogenic liquid or excessive vapors allowed.~~

~~ETM\_\_\_\_\_ Date\_\_\_\_\_~~

~~Support: COMM~~

~~Not Performed:\_\_\_\_\_~~

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

60-7 Record LO<sub>2</sub> Topping date and time (GMT).

LO<sub>2</sub> Topping Date\_\_\_\_\_ GMT Time\_\_\_\_\_ GMT

ETM\_\_\_\_\_ Date\_\_\_\_\_

Not Performed:\_\_\_\_\_

60-8 Record LO<sub>2</sub> Stable Replenish mode start date and time (GMT).

LO<sub>2</sub> Stable Replenish Date\_\_\_\_\_ GMT Time\_\_\_\_\_ GMT

ETM\_\_\_\_\_ Date\_\_\_\_\_

Not Performed:\_\_\_\_\_

60-9 CVM1 JTV1 223

From time LO<sub>2</sub> Stable Replenish mode is established until time for final SSV scan (approximately L-2 hours), **monitor, scan and videotape** ET-TPS surfaces on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169. No cryogenic liquid or excessive vapors allowed.

ETM\_\_\_\_\_ Date\_\_\_\_\_

Support: COMM

Not Performed:\_\_\_\_\_

ET  
01  
11/29/01



09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

### Final SSV Inspection Scan

#### NOTE

Final SSV Inspection Scan should begin not later than 1.5 hours prior to start of T-9 minute hold (approximately L-2 hours) to allow ample time to finish. Final SSV Inspection Scan shall include the ET, SRB's and the Orbiter.

Final scan may be altered or partially performed in the event that time constraints will not permit a complete SSV scan prior to start of T-9 minute hold.

During Final SSV Inspection Scan the camera lights on OTV cameras 061/161 and 062/162 shall be turned "Off" when view passes over the Orbiter cockpit to preclude "distracting" the Flight Crew.

60-10 CVM1 JTV1 223

**Perform** Final SSV Inspection Scan with OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163 and 064/164. Scan passes shall view entire SSV with cameras at approximate full zoom in during final scan.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Not Performed: \_\_\_\_\_

### Terminal Count Camera Positions

#### NOTE

This step performed for SSME ignition only and may be not performed if launch is scrubbed prior to pick-up of T-9 minute count. Cameras must be positioned for ignition no later than T-9 minutes. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition in an arbitrary order.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for OTV operators to rehearse camera movements.

CVM1 camera positions for SSME ignition are defined in Table 60-1.

60-11 CVM1 JTV1 223

Ref Table 60-1, **position** cameras 004/104, 013/113, 042/142, 054/154, 060/160, 062/162 for terminal count.

Support: COMM

ETM \_\_\_\_\_ Date \_\_\_\_\_

Not Performed: \_\_\_\_\_

60-12 Operation - Group 1 Monitoring - LO<sub>2</sub> Chill Down Thru T-0 complete.

Table 60-1 CVM1 Camera Positions for Terminal Count

**NOTE**

This Table defines CVM1 camera positions for terminal countdown. Cameras should be positioned for ignition no later than pick-up of T-9 minutes count. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition non-sequentially.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for operators to rehearse camera movements with ice console.

The GO<sub>2</sub> Vent Arm (GVA) retracts at T-2m30s.

**CVM1 Camera Positions Are Defined As Follows:**

**004/104**

GUCP centered in frame so that GUCP will stay in view throughout SRB "twang".

**042/142**

At approximately T-1 hour, view and monitor Orbiter access arm while Orbiter hatch is being closed.

At **T-7m30s**, watch Orbiter access arm retract, then view bipod strut in center of frame, LO<sub>2</sub> feedline fairing in top of frame, and Orbiter hatch in right of frame.

**054/154**

At **T-3m50s**, view Orbiter right hand body flap movement, then zoom out with Orbiter/ET umbilicals at approximate frame center, Orbiter trailing edge at frame bottom, and edge of +Y (RH) SRB just in view at frame right.

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

**Table 60-1 CVM1 Camera Positions for Terminal Count**

**013/113**

At **T-2m30s**, watch lift of GO<sub>2</sub> vent arm for debris and nose cone/vent louvers for ice damage. Immediately following lift of GO<sub>2</sub> vent arm, center frame on GO<sub>2</sub> vent louver and then zoom-out so that entire ET movement is seen during SRB 'twang' at SSME ignition.

**060/160**

At approximately **T-2m30s**, after GO<sub>2</sub> vent arm retracts, go full zoom in for a close-up inspection of the GO<sub>2</sub> vent louver. After CICE concurrence, go full zoom out and position camera with SSV centered and ET nose cone at frame top.

**062/162**

At approximately **T-2m30s**, after GO<sub>2</sub> vent arm retracts, go full zoom in for a close-up inspection of the -Y GO<sub>2</sub> vent louver. After CICE concurrence, zoom out until ET nose spike is at top of frame with ET centered.

**061/161**

At approximately **T-4m00s**, verify camera lights are off. Then position camera to view astronaut closing visor at T-2 minutes 00 seconds.

**068/168 and 069/169**

Immediately after GO<sub>2</sub> vent hood lift, turn lights off to preclude distracting orbiter crew when the GVA rotates to its latchback position.

**\*\*\* End of Table 60-1 Camera Positions for Terminal Count \*\*\***

**\*\*\* End of Operation 60 \*\*\***

ET  
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

## OPERATION 70 Group 2 Monitoring - LH<sub>2</sub> Chill Down Thru T-0

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 15.0

### NOTE

Do not perform this operation if launch scrub declared before start of LH<sub>2</sub> Chill Down.

Operation Not Performed:

ET  
01

11/29/01

### NOTE

This operation monitors LH<sub>2</sub> Barrel and associated components/areas start of LH<sub>2</sub> Chill Down to pre-pressurization via OTV cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167.

Steps in this operation are contingent upon progression of launch countdown operations and may be not performed if countdown is terminated.

ET  
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

### LH<sub>2</sub> Chill Down To L-2 Hour Mark

**70-1 CVM2 JYVR 138**

At start of LH<sub>2</sub> Chill Down, **start** recorders for cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167.

ETM\_\_\_\_\_ Date\_\_\_\_\_

Support: COMM

**70-2 Record LH<sub>2</sub> Chill Down start date and time (GMT).**

LH<sub>2</sub> Chill Down Date\_\_\_\_\_ Time\_\_\_\_\_ GMT

ETM\_\_\_\_\_ Date\_\_\_\_\_

**70-3 CVM2 JTV2 225**

From start of propellant loading until start of LH<sub>2</sub> Fast Fill on OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167, **monitor/videotape** ET-TPS surfaces. No cryogenic liquid or excessive vapors allowed.

ETM\_\_\_\_\_ Date\_\_\_\_\_

Support: COMM

**Not Performed:**\_\_\_\_\_

ET  
01

11/29/99

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

~~70-4 Record LH<sub>2</sub> Slow Fill start date and time (GMT).~~

~~LH<sub>2</sub> Slow Fill Date\_\_\_\_\_ Time\_\_\_\_\_ GMT~~

~~ETM\_\_\_\_\_ Date\_\_\_\_\_~~

~~Not Performed:\_\_\_\_\_~~

~~70-5 Record LH<sub>2</sub> Fast Fill start date and time (GMT).~~

~~LH<sub>2</sub> Fast Fill Date\_\_\_\_\_ Time\_\_\_\_\_ GMT~~

~~ETM\_\_\_\_\_ Date\_\_\_\_\_~~

~~Not Performed:\_\_\_\_\_~~

~~70-6 CVM2 JTV2 225~~

~~From start of LH<sub>2</sub> Fast Fill until stable replenish mode is established, scan  
LH<sub>2</sub> Tank. Alternate OTV cameras 033/133, 054/154, 055/155, 056/156,  
065/165, 066/166 and 067/167 and scan/videotape from LH<sub>2</sub> Aft Dome to  
Intertank.~~

~~ETM\_\_\_\_\_ Date\_\_\_\_\_~~

~~Support: COMM~~

~~Not Performed:\_\_\_\_\_~~

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

70-7

**Record** start date and time (GMT) for LH<sub>2</sub> Topping.

LH<sub>2</sub> Topping Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

**Not Performed:** \_\_\_\_\_

70-8

**Record** LH<sub>2</sub> Stable Replenish mode start date and time (GMT).

LH<sub>2</sub> Stable Replenish Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

**Not Performed:** \_\_\_\_\_

70-9

**CVM2 JTV2 225**

During LH<sub>2</sub> Stable Replenish mode and until time for final scan (approximately L-1.5 hours), on OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167, **monitor/videotape** ET TPS surfaces including LO<sub>2</sub> Feed Line, LH<sub>2</sub> Feed Line, LH<sub>2</sub> Recirculation Line, LH<sub>2</sub> Aft Dome and manhole covers, LH<sub>2</sub>/LO<sub>2</sub> Umbilicals, and TSM LH<sub>2</sub>/LO<sub>2</sub> Umbilicals. No cryogenic liquid or excessive vapors allowed.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

**Not Performed:** \_\_\_\_\_

ET  
01  
1/29/01



09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

### Final SSV Inspection Scan

#### NOTE

Final SSV Inspection Scan should begin not later than 1.5 hours prior to start of T-9 minute hold (approximately L-2 hours) to allow ample time to finish. Final SSV Inspection Scan shall include the ET, SRB's and the Orbiter.

Final SSV Inspection Scan may be altered or partially performed in the event that time constraints will not permit a complete SSV scan prior to start of T-9 minute hold.

70-10 CVM2 JTV2 225

**Perform** Final SSV Inspection Scan with OTV cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 064/164. Scan passes shall view entire SSV with cameras at full zoom in during final scan.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

Not Performed: \_\_\_\_\_

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

### T-9 Minute Terminal Count

#### NOTE

Next step performed for terminal count only and may be not performed if launch is scrubbed prior to pick-up of T-9 minute terminal count. Cameras must be positioned for SSME ignition no later than T-9 minutes. 'Spot' scanning after pick-up of the T-9 minute terminal count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition in an arbitrary order.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for OTV operators to rehearse camera movements.

CVM2 camera positions for terminal count are defined in Table 70-1.

70-11 CVM2 JTV2 225

Ref Table 70-1, **position** cameras 009/109, 033/133, 056/156, 065/165, 066/166 061/161, 070/170, 071/171 and 067/167 for terminal count.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

Not Performed: \_\_\_\_\_

70-12 Operation - Group 2 Monitoring - LH<sub>2</sub> Chill Down Thru T-0 complete.

ET  
01

11/29/01

Table 70-1 - CVM2 Camera Positions for Terminal Count

**NOTE**

This Table defines CVM2 camera positions for terminal countdown. Cameras should be positioned for ignition no later than pick-up of T-9 minutes count. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

The Orbiter access arm (OAA) retracts at T-7M30S. Orbiter body flap movement occurs at T-3m50s.

Cameras may be positioned for SSME ignition non-sequentially

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for operators to rehearse camera movements with ice console.

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

**Group 2 Camera Positions Are Defined As Follows:**

**033/133**

Full zoom out. LO<sub>2</sub> feed line in frame center and MLP deck at bottom.

**053/155**

View ET aft dome with MLP deck just out of view at bottom, ET XT-2058 ring frame at frame top and both SRB's just in view at sides.

**056/156**

View ET aft dome with MLP deck just out of view at bottom. ET XT-2058 ring frame at frame top and both SRB's just in view at sides.

**065/165**

Full zoom out. SSV centered. MLP deck edge just in view at bottom.

**066/166**

ET centered. Intertank to LO<sub>2</sub> Barrel splice at frame top with the majority of Orbiter wing in view.

**067/167**

Center on GUCP for optimum view.

**070/170 and 071/171**

At **T-9m00s**, zoom in on space shuttle main engine with camera providing best view. Zoom out on SSME for wide angle view with other camera.

**009/109**

At approximately **T-3m50s**, position to view Orbiter body flap and elevons movement. Afterwards, center on LH<sub>2</sub> umbilical with -Y vertical strut at frame top.

**061/161**

At approximately **T-1m30s**, tilt-up to GO<sub>2</sub> Vent Footprint. Zoom in. Pause. If footprint is acceptable, zoom out and tilt down to view Orbiter nose/cockpit through liftoff.

**\*\*\* End of Table 70-1 - CVM2 Camera Positions for Terminal Count \*\*\***

**\*\*\* End of Operation 70 \*\*\***

ET  
01  
11/29/99

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

## OPERATION 80 Final Inspection

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: PAD A/B  
Hazard (Y/N): Y  
Duration (Hrs): 3.0

### NOTE

Final Inspection may not need to be performed depending on LO<sub>2</sub>/LH<sub>2</sub> tanking and launch countdown, as determined by CTC/TTL.

Final Inspection Team stay time guidelines for each level are given in Table 80-1. These guidelines are for reference only and may be deviated from at PICE discretion.

Operation Not Performed:

ET  
01

11/29/01

ET  
01

11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

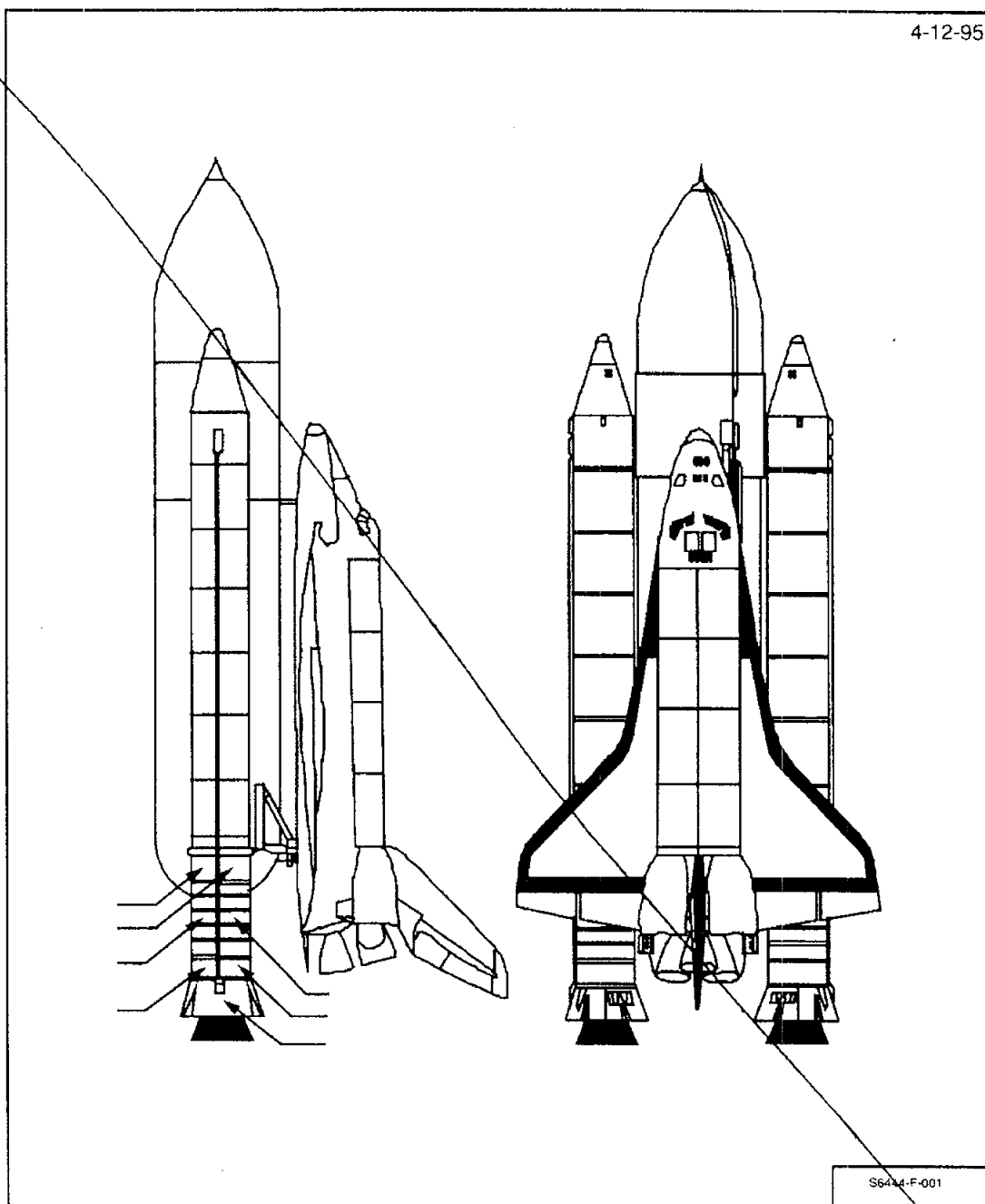


Figure 80-1: Deck (0) Level  
(For Reference Only)

4-13-95

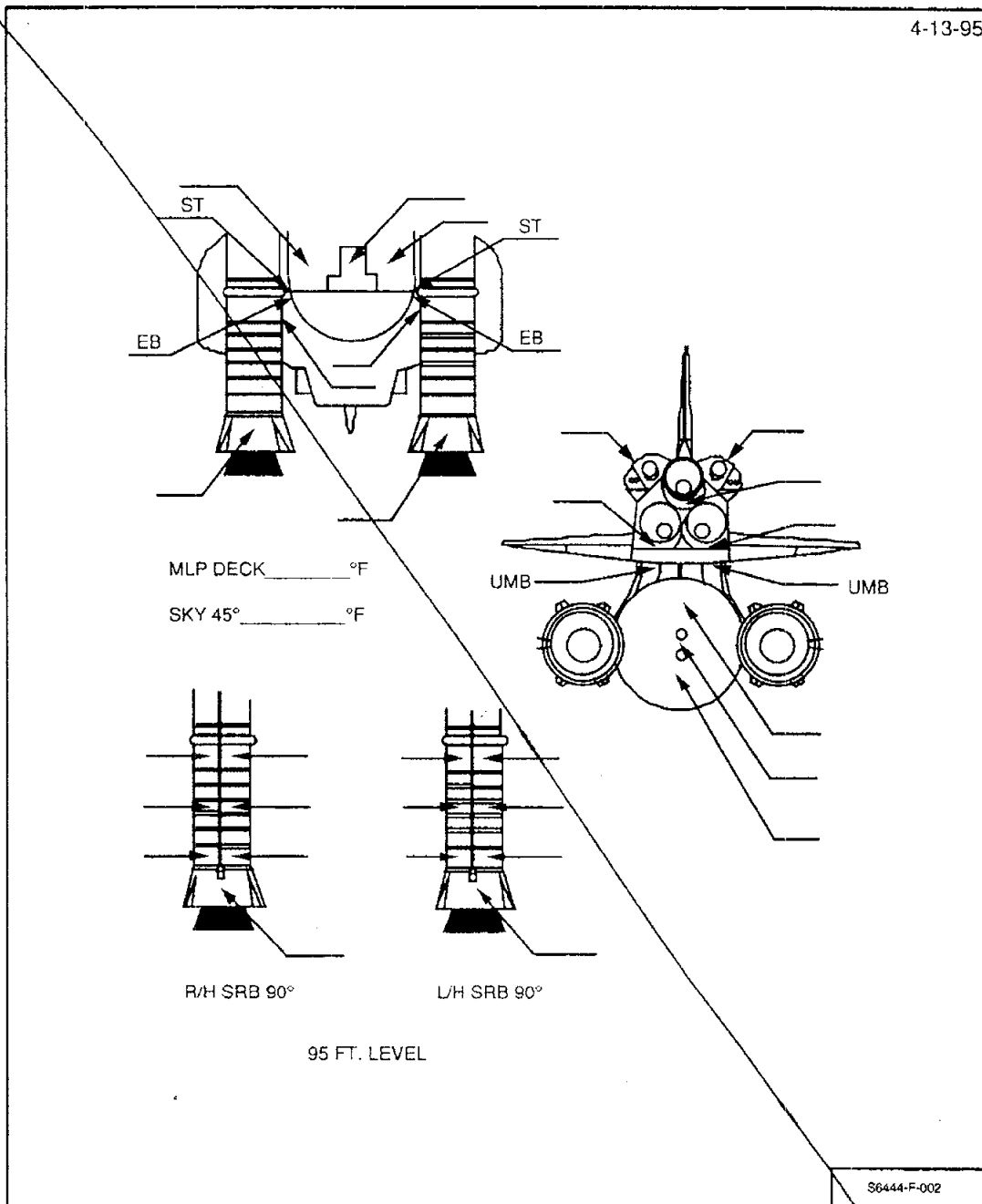
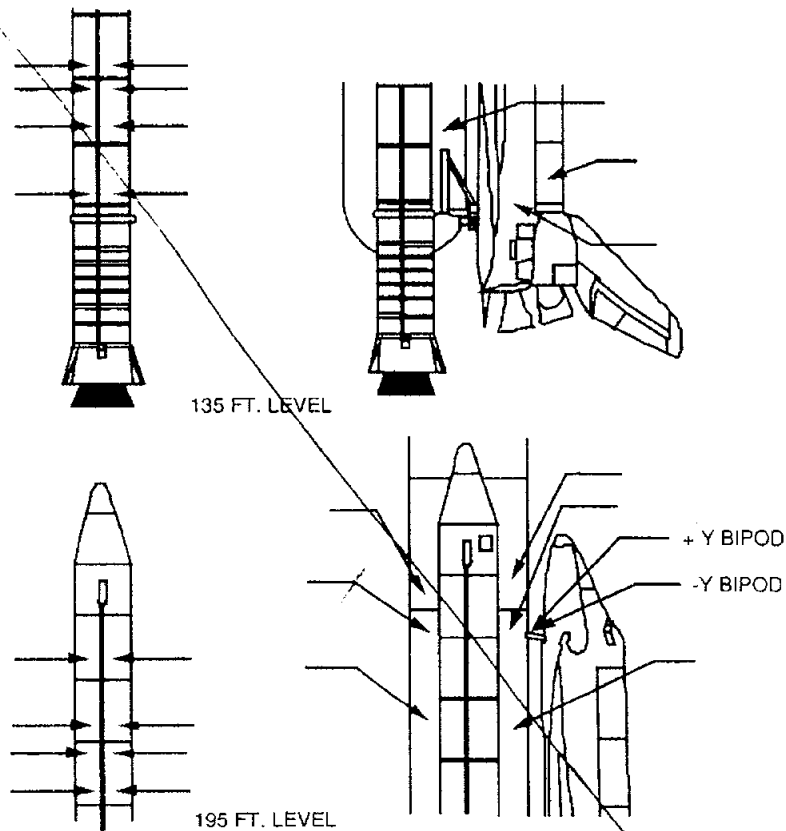


Figure 80-2: Deck (0) and 95 Ft Levels  
(For Reference Only)

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4-12-95



S6444-F-003

Figure 80-3: 135 and 195 Ft Levels  
(For Reference Only)



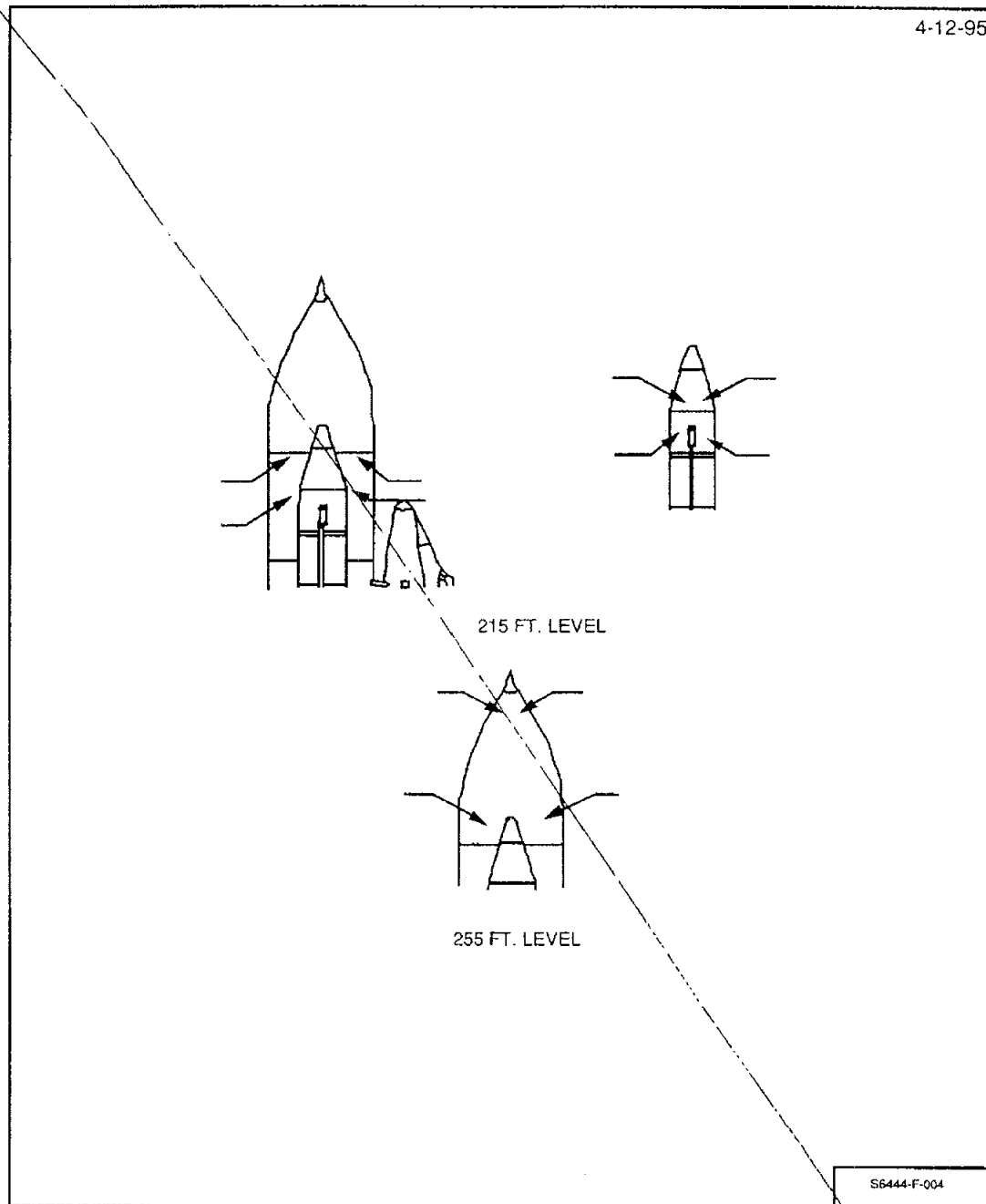


Figure 80-4: 215 and 255 Ft Levels  
(For Reference Only)

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**WARNING**

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

**WARNING**

Personnel performing final inspection shall be attired in **Nomex coveralls with gloves and hoods**. Personnel shall have available gloves, hoods, and ELSA at all times during walkdown.

Personnel using Sony DKC-ID1 camera shall verify lithium ion battery is securely locked in bayonet connector and the lithium button battery door is locked and taped in place. Personnel shall ensure the flash is not activated on the camera.

Personnel using Kodak DC-50/120 shall verify alkaline batteries are properly installed and the flash is not active on the camera.

Personnel using digital cameras (Sony DKC ID1, Kodak DC-50/120 shall not use these cameras in the presence of a hydrogen leak or an oxygen enriched atmosphere (readings greater than 23 percent O<sub>2</sub>).

**NOTE**

Task Team Leader (TTL) for final inspection is PH-H. Additional personnel (listed below) may be added to the final inspection team with CTC, Launch Director, and Safety concurrence.

JSC Level II	(1)
PH-H	(2)
SFOC ETM	(1)

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**80-1** Assemble following final inspection team members:

TTL - PH-H	(1)
PH-H	(1)
SFOC ETM	(2)
LMSSC LSS	(1)
SFOC Safety	(1)

**80-2** Final inspection team **perform** walkdown of SSV and associated facilities as follows:

**NOTE**

Following substep may be not performed with TTL concurrence.

Tables 80-2 and 80-3 are reference only items. Images are to be taken of targets of opportunity. Images must be taken with 35 mm and digital cameras. Digital images shall be inputted into SIMS.

1. Ref Tables 80-2 and 80-3, photograph SSV points of opportunity during final inspection using 35 mm. **Record** data.

Roll No. \_\_\_\_\_

Negative No. \_\_\_\_\_

Work order No. \_\_\_\_\_

**Sub Step Not Performed:** \_\_\_\_\_

2. Reference Tables 80-2 and 80-3, **take** digital image of SSV points of opportunity using digital camera.

Description: Final Inspection Team

3. See Figures 80-1 through 80-4, **measure and record** (deg F) SSV external surface temperatures using IR gun(s)/scanners.

**NOTE**

The following substep references inspection areas. However, inspection shall not be limited to these areas. Inspection shall be of entire SSV and specific areas of concern as defined by the TTL, CTC, or Launch Director.

**4. Visually inspect:**

- Orbiter aft engine compartment external surfaces for condensation and ice formations.
- ET TPS surfaces which cannot be observed by the OTV system.
- Specific areas of concern as determined by the TTL, CTC, or Launch Director.

OMRSD S00U00.020-A-1

OMRSD S00U00.020-C-1

OMRSD S00U00.020-D-1

**80-3** Final Inspection complete. **Verify** no constraints to continue.

TTL (PH-H) \_\_\_\_\_ Date \_\_\_\_\_

SFOC-ETM \_\_\_\_\_ Date \_\_\_\_\_

**80-4** Operation - Final Inspection complete.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Table 80-1 Final Inspection Team Walkdown Stay Times

255 Ft Level - 5 Minutes

- LO<sub>2</sub> Ogive and Barrel acreage
- GO<sub>2</sub> Pressurization Line
- LO<sub>2</sub> Tank Cable Tray
- Visible LH SRB surfaces
- GO<sub>2</sub> Vent Ducts

215 Ft Level - 20 Minutes

- ET GH<sub>2</sub> 7 inch Vent Assembly
- ET acreage (between -Z and -Y axis)
- GO<sub>2</sub> vent area
- Orbiter tiles
- Visible SRB surfaces
- Inter tank-to-LO<sub>2</sub> Barrel splice

195 Ft Level - 10 Minutes

- LO<sub>2</sub> Feed Line
- ET/Orbiter Bipods (side and bottom view)
- -Y ET/SRB forward attachment (bottom view)
- -Y ET/SRB aft attachments (top view)
- Inter tank splice areas (LO<sub>2</sub> and LH<sub>2</sub>)
- ET acreage (between -Y and +Z axis)
- Orbiter tiles
- Visible LH SRB surfaces

135 Ft Level - 10 Minutes

- LH<sub>2</sub> ET/Orbiter Umbilical
- -Y ET/SRB C/T
- -Y Vertical Strut
- LO<sub>2</sub> Feed Line
- ET acreage between -Y axis and +Z axis
- ET/Orbiter attachments (top view)
- Visible LH SRB surfaces
- Orbiter aft fuselage

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**Table 80-1 Final Inspection Team Walkdown Stay Times**  
**Q Level - 30 Minutes**

- LH<sub>2</sub> Aft Dome
- ET acreage around +Z axis
- ET acreage around -Z axis
- LO<sub>2</sub> Feed Line
- LH<sub>2</sub> Feed Line
- ET/Orbiter attachments - Bottom view
- ET/Orbiter LH<sub>2</sub> and LO<sub>2</sub> Umbilicals
- T-0 LH<sub>2</sub> and LO<sub>2</sub> Umbilicals
- Space Shuttle Main Engines (SSME)
- Orbiter tiles
- ET/SRB aft attachments
- Visible SRB surfaces
- SRB ignition overpressure sound suppression water troughs

\*\*\* End of Table 80-1- Final Inspection Team Walkdown Stay Times \*\*\*

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Table 80-2 Final Inspection Team - Telephotos

**TELEPHOTOS - 255 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	Horizontal	
LO <sub>2</sub> Acreage	Vertical	

**TELEPHOTOS - 215 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
-Y Bipod Ramp	Horizontal	From RSS
LO <sub>2</sub> P/L Ice Frost Ramps	Vertical	From RSS; Requires 3-4 shots
GO <sub>2</sub> Seal/Hood	Horizontal	From haunch & RSS
GUCP	Vertical	

**TELEPHOTOS - 195 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
-Y Bipod Ramp & Jack PAD C/O	Horizontal	

**TELEPHOTOS - 135 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	
-Y Longeron	Vertical	If needed
Jack Pad Closeouts	Horizontal	
LH <sub>2</sub> Acreage	Vertical	

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Table 80-2 Final Inspection Team - Telephotos

TELEPHOTOS - MLP

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	From West
LH <sub>2</sub> UMB	Horizontal	From NW
EB-7	Horizontal	
EB-8	Horizontal	
LH <sub>2</sub> Aft Dome	Horizontal	
Third Hard Point C/O	Vertical	
LH <sub>2</sub> Barrel	Horizontal	From North
SSV Overall	Horizontal	From North
SSV Overall	Horizontal	From East
LO <sub>2</sub> F/L Bracket & Bellows	Vertical	XT-1973
LO <sub>2</sub> F/L Bracket	Vertical	XT-1871
LO <sub>2</sub> F/L Bracket	Vertical	XT-1623
LO <sub>2</sub> F/L Bracket	Vertical	ST-1377 & XT-1129
LO <sub>2</sub> F/L Bracket & Bellows	Vertical	XT-1129 & XT-1106 from SE
LO <sub>2</sub> P/L & C/T	Vertical	From SE

600 MM PHOTOS - 255 FT LVL

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	1/30	Contingency

600 MM PHOTOS - 215 FT LVL

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**Table 80-2 Final Inspection Team - Telephotos**

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
-Y GO <sub>2</sub> Seal	1/30	
-Y Bipod Ramp	1/30	Contingency
Jack Pad C/O's	1/4	Difficult if windy
LO <sub>2</sub> F/L	1/15	
-Y Vertical Strut (Crack)	1/30	

**600 MM PHOTOS - 195 FT LVL**

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
-Y Bipod Ramp	1/30	Contingency

**600 MM PHOTOS - 135 FT LVL**

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
LH <sub>2</sub> UMB	1/30	
-Y Vertical Strut (Crack)	1/60	
LO <sub>2</sub> F/L Bellows	1/15	Contingency

**600 MM PHOTOS - MLP**

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Table 80-2 Final Inspection Team - Telephotos

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
LH <sub>2</sub> UMB	1/30	From West
LH <sub>2</sub> UMB	1/30	From NW
LH <sub>2</sub> UMB	1/30	From East
LH <sub>2</sub> UMB Actuator C/O	1/15 or 1/30	From North standing next to water pipe
LO <sub>2</sub> UMB	1/5	Lower Inboard
LO <sub>2</sub> UMB	1/8	Inboard
LO <sub>2</sub> F/L Bracket & Bellows	1/15	One photo to include XT-1978 & XT-1973
LO <sub>2</sub> F/L Bracket	1/15	XT-1871
LO <sub>2</sub> F/L Bracket	1/15	XT-1623
LO <sub>2</sub> F/L Bracket	1/15	XT-1377
LO <sub>2</sub> F/L Bracket	1/30	One photo to include XT-1129 & XT-1106
LO <sub>2</sub> F/L Bracket	1/30	From SE corner; One photo to include XT- 1129 & XT-1106
Jack Pad C/O's	1/15	From SE corner
Ice Frost Ramps or Pal Ramps	1/15 or 1/30	Contingency
LH <sub>2</sub> UMB Inboard	1/15	From East
+Y Longeron	1/15 or 1/30	Contingency
-Y Longeron	1/15	Contingency

WIDE ANGLE PHOTOS - 255 FT LVL

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Table 80-2 Final Inspection Team - Telephotos

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LO <sub>2</sub> Tank	Vertical	35-70 mm	
GO <sub>2</sub> Vent Ducts	Horizontal	35-70 mm	

WIDE ANGLE PHOTOS - 215 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Overall GH <sub>2</sub> Vent Line	Horizontal	35-70 mm	
Orbiter Nose, ET -Y Side	Horizontal	35-70 mm	
Orbiter Nose, ET -Y, +Z Side	Horizontal	35-70 mm	From RSS
Forward Half of Vehicle	Vertical	28 mm	From RSS
Entire Orbiter	Vertical	28 mm	From RSS

WIDE ANGLE PHOTOS - 195 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Aft Part of SSV, LH Wing	Vertical	35-70 mm	
Orbiter Fwd Section, Upper LH <sub>2</sub> Tank	Vertical	35-70 mm	
Bipod, -Y, +Z Intertank Area	Horizontal	35-70 mm	

WIDE ANGLE PHOTOS - 135 FT LVL

<u>Photo</u>	<u>Camera</u>	<u>Lens</u>	<u>Notes</u>
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Table 80-2 Final Inspection Team - Telephotos  
Orientation

Orbiter Aft Section	Vertical	35-70 mm
Lower LH <sub>2</sub> Tank & LH SRB	Vertical	35-70 mm

WIDE ANGLE PHOTOS - MLP

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Overall Orbiter Left Side	Vertical	28 mm	
ET -Y, +Z Quadrant	Vertical	28 mm	
ET -Z Side	Vertical	28 mm	
ET +Y, +Z Quadrant	Vertical	28 mm	
Overall Orbiter Right Side	Vertical	28 mm	
ET Aft Dome	Horizontal	35-70 mm	
-Z Side of LO <sub>2</sub> T-0; RCS Stinger	Horizontal	35-70 mm	
+Z Side of LO <sub>2</sub> T-0; RCS Stinger OMS Nozzle	Horizontal	35-70 mm	
-Z Side of LH <sub>2</sub> T-0; RCS Stinger	Horizontal	35-70 mm	
+Z Side of LH <sub>2</sub> T-0; RCS Stinger OMS Nozzle	Horizontal	35-70 mm	
Overall SSME Cluster	Horizontal	50 mm	-Y Side
SSME No. 2	Horizontal	50 mm	
SSME No. 1, -Z Side	Horizontal	50 mm	
SSME No. 3	Horizontal	50 mm	
Overall SSME Cluster	Horizontal	50 mm	+Y Side
LO <sub>2</sub> UMB Area	Horizontal	35-70 mm	
LH <sub>2</sub> UMB Area	Horizontal	35-70 mm	
ET/ORB UMB & ORB	Horizontal	28 mm	From under ET

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Table 80-2 Final Inspection Team - Telephotos  
Lower Surface

\*\*\* End of Table 80-2 Final Inspection Team - Telephotos \*\*\*

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Table 80-3 Reduced Final Inspection Team Photos

**WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 255 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	TELE	Horizontal	

**WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 215 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
-Y Bipod Ramp	Horizontal	TELE	From RSS
LO <sub>2</sub> P/L Ice/Frost Ramps	Vertical	TELE	From RSS; 2 photos required
GO <sub>2</sub> Seal/Hood	Horizontal	TELE	From RSS
GUCP	Vertical	TELE	
Fwd Half of SSV	Vertical	28 mm	From RSS
Entire Orbiter	Vertical	28 mm	From RSS

**WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 195 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
-Y Bipod Ramp & Jack Pad C/O's	Horizontal	TELE	

**WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 135 FT LVL**

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Table 80-3 Reduced Final Inspection Team Photos

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	TELE	
Orbiter Aft Section	Vertical	35-70 mm	

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - MLP DECK

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	TELE	From West
ET Aft Dome	Horizontal	TELE	
Aft Hard Point Closeout	Vertical	TELE	
LH <sub>2</sub> Tank	Horizontal	TELE	From North
LO <sub>2</sub> Tank	Horizontal	TELE	From North
LO <sub>2</sub> Tank	Horizontal	TELE	From East
LO <sub>2</sub> F/L Bracket Bellows	Horizontal	TELE	XT - 1978 & XT - 1973
LO <sub>2</sub> F/L Bracket	Horizontal	TELE	XT - 1871
LO <sub>2</sub> F/L Bracket	Horizontal	TELE	XT - 1623
LO <sub>2</sub> F/L Brackets	Horizontal	TELE	XT - 1377 & XT - 1129
LO <sub>2</sub> F/L Brackets & Bellows	Horizontal	TELE	XT - 1129 & XT - 1108; from SE
LO <sub>2</sub> P/L & C/T	Horizontal	TELE	From SE
Overall Orbiter Left Side	Vertical	28 mm	
ET -Z Side	Vertical	28 mm	
Overall Orbiter Right Side	Vertical	28 mm	
Overall SSME Cluster -Y Side	Horizontal	28 mm	
Overall SSME Cluster +Y Side	Horizontal	28 mm	

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**Table 80-3 Reduced Final Inspection Team Photos**

ET/Orb UMB & Orbiter Lower Surface	Horizontal	28 mm	From under ET
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\*\*\* End of Table 80-3 - Reduced Final Inspection Team Photos \*\*\*

\*\*\* End of Operation **80** \*\*\*

u/29/01



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## OPERATION 90 LO<sub>2</sub>/LH<sub>2</sub> Drain Monitoring

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 4.0

### NOTE

This operation is contingent upon progression of launch countdown and is performed after start of cryo (LO<sub>2</sub>/LH<sub>2</sub>) loading and subsequent launch scrub, FRF, or WCDDT.

Operation Not Performed:

ET  
01  
11/29/01

### NOTE

This operation monitors the External Tank external surfaces during LO<sub>2</sub>/LH<sub>2</sub> drain operations from time of detanking until 1.5 hours after LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry via OTV 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171.

Noted requirements satisfied by this operation: OMRS S00E00.021

90-1 Record start date/time (GMT) of LH<sub>2</sub> and LO<sub>2</sub> Tank Drain.

LH<sub>2</sub> Drain Start Date N/A Time N/A GMT

LO<sub>2</sub> Drain Start Date N/A Time N/A GMT

ETM N/A Date N/A

09-01-2001  
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90-2 CVM1 JTV1 223

From start of LO<sub>2</sub> Tank Drain and LH<sub>2</sub> Tank Drain until respective LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry, **monitor** ET external surfaces including LO<sub>2</sub> Feed Line, LH<sub>2</sub> Feed Line, LH<sub>2</sub> Recirculation Line, LH<sub>2</sub> Aft Dome and manhole covers, LH<sub>2</sub>/LO<sub>2</sub> Umbilicals, TSM LH<sub>2</sub>/LO<sub>2</sub> Umbilicals via OTV cameras. No cryogenic liquid or excessive vapors allowed.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

90-3 **Record** date/time (GMT) when LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry.

LH<sub>2</sub> Sensors Dry Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

LO<sub>2</sub> Sensors Dry Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

09-01-2001  
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90-4 CVM1 JTV1 223

Monitor ET external surfaces including LO<sub>2</sub> Feed Line, LH<sub>2</sub> Feed Line, LH<sub>2</sub> Recirculation Line, LH<sub>2</sub> Aft Dome and manhole covers, LH<sub>2</sub>/LO<sub>2</sub> Umbilicals, TSM LH<sub>2</sub>/LO<sub>2</sub> Umbilicals via OTV cameras for 1.5 hours after LO<sub>2</sub>/LH<sub>2</sub> low level sensors have read dry. No cryogenic liquid or excessive vapors allowed. Record date/time (GMT) when monitoring complete.

LH<sub>2</sub> Complete Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

LO<sub>2</sub> Complete Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

90-5 Completion of this operation satisfies noted requirements.

553 OMRSD S00E00.021

90-6 Operation - LO<sub>2</sub>/LH<sub>2</sub> Drain Monitoring complete.

\*\*\* End of Operation 90 \*\*\*

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## OPERATION 100 Console Securing

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.5

### 100-1

CTIF	TBC	136
TBC	CTC	232

OTV support for ET thermal protection system evaluation no longer required.

### 100-2

CTIF	JYVR	138
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**Perform** the following:

1. **Turn off** video recorders.
2. **Remove** tape cartridges.
3. OTV support no longer required.

Support: COMM

### 100-3

CTIF	CVM1	222
	CVM2	

**Secure** consoles by setting all monitors to "Off" position.  
**Report** completion.

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**NOTE**

Perform next step only after a successful launch.

**100-4**

**CTIF**

**Remove** photo processing laptop computer from Firing Room.

**Not Performed:**

ET  
01

11/29/01

**100-5**

<b>CTIF</b>	<b>TBC</b>	<b>136</b>
<b>TBC</b>	<b>CTC</b>	<b>232</b>

Firing Room 2, ice frost monitoring area securing complete.

**100-6**

Operation 100 - Console Securing complete.

ET  
01

ETM

Date

11/29/01

\*\*\* End of Operation **100** \*\*\*

ET  
01

11/29/01

**100-2**

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## OPERATION 110 Summary Tape

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 18.0

### NOTE

THIS OPERATION MAY BE NOT  
PERFORMED IF CRIB LOADING  
NOT INITIATED.

①

OP 110 N/A

11/29/01

### NOTE

Observations/concerns observed during count are typically recorded on the  
summary tape real-time (trouble tape).

### 110-1 CICE

After launch or launch scrub, prepare a summary tape to include  
observations/concerns noted during count.

### 110-2 Operation Summary Tape complete.

ETM N/A Date N/A

\*\*\* End of Operation 110 \*\*\*

① TRS  
D. Scule  
11/29/01

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## OPERATION 120 Post Drain Walkdown

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: PAD A/B  
Hazard (Y/N): Y  
Duration (Hrs): 2.0

### NOTE

Post drain walkdown performed only after start of cryo (LH<sub>2</sub>/LO<sub>2</sub>) loading and subsequent launch scrub.

Operation Not Performed:

ET  
01

11/29/01

### WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

Personnel shall wear **hardhats** and **flame retardant coveralls** while performing post drain walkdown.

### NOTE

Post drain walkdown typically commences approximately 1.5 hours after LH<sub>2</sub>/LO<sub>2</sub> low level sensors read dry.

Post drain walkdown performed in support of a 24 hour scrub turnaround is typically coincident with the L-20 hour pre-launch walkdown for the ensuing launch attempt.

**NOTE**

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are walkdown optional participants:

NASA Engr	(4)
SFOC Engr	(2)
LMSSC-LSS	(1)
Boeing LSS	(1)
SFOC Safety	(1)

- 120-1** NASA Lead ET Mechanical Systems Engineer (PH-H) verify essential personnel on station, properly attired, and ready to proceed with post drain walkdown.

**Essential Personnel**

NASA Engineering (PH-H)	1
SFOC Engineering (ETM)	1

**NOTE**

"Hands-on Investigation" is applicable only to those areas which are not understood or fully defined and which cannot be adequately evaluated otherwise.

- 120-2** **Perform** post drain walkdown as follows:

- 1. Visually inspect** ET TPS exterior surfaces after detanking and warm-up (approximately T + 4 hours after drain is initiated) from the MLP, FSS, and RSS as access permits.
- 2. Perform** hands-on investigation of all areas suspected of violating Doc: NSTS 08303 (LI) NSTS PROGRAM ICE/DEBRIS INSPECTION CRITERIA (LI)

OMRSD S00E00.031



09-01-2001  
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~~120-3~~ Walkdown complete. All discrepancies identified. No constraints to  
continue.

PH-H \_\_\_\_\_ Date \_\_\_\_\_

ETM \_\_\_\_\_ Date \_\_\_\_\_

120-4 Operation Post Drain Walkdown complete.

\*\*\* End of Operation 120 \*\*\*

120-3

ET  
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120-3

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## OPERATION 130 Post Launch Walkdown

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: PAD A/B  
Hazard (Y/N): Y  
Duration (Hrs): 3.0

### NOTE

Do not perform this operation after launch scrub.

Operation Not Performed:

ET  
01  
11/29/01

### WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

Personnel participating in walkdown shall wear **hardhats** and **flame retardant coveralls**.

### NOTE

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are walkdown optional participants:

NASA Engr	(3)
SFOC Engr	(2)
LMSSC-LSS	(1)
Boeing LSS	(2)
SRB ELE	(1)
Thiokol-LSS	(1)
SFOC Safety	(1)

ET  
01  
11/29/01

09-01-2001  
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- 130-1 NASA (PH-H) **verify** following personnel on station, properly attired, and ready to proceed with post launch walkdown.

Essential Personnel		
NASA	PH-H	1
SFOC	ETM	1

**NOTE**

Post Launch Walkdown must be performed prior to washdown and Pad being opened for normal work.

- 130-2 **Perform** Post Launch Walkdown as follows:

1. Ref Table 130-1, **visually inspect** post launch pad/area to identify any lost flight or ground systems hardware and debris sources.
2. Ref Table 130-2, **document/SIMS photograph** launch PAD area configuration.

Description: Post Launch Walkdown

OMRSD S00U00.010-1

- 130-3 Walkdown complete. Debris sources and lost flight hardware identified. No constraints to continue.

PH-H \_\_\_\_\_ Date \_\_\_\_\_

ETM \_\_\_\_\_ Date \_\_\_\_\_

- 130-4 Operation - Post Launch Walkdown complete.

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**Table 130-1 Post Launch Walkdown Inspection Areas**

**Record mission info, PAD, date, and time:**

STS \_\_\_\_\_

PAD \_\_\_\_\_

Date \_\_\_\_\_

Time \_\_\_\_\_

**SRB Hold-down posts (HDP)**

Inspect for damage, stud hang-up Epon shim material, ordnance fragments, doghouse blast covers, erosion, missing hardware, debris. Record Results:

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**MLP Deck**

SRB aft skirt purge lines  
SRB T-0 umbilicals  
Tail service masts (TSM's)  
MLP deck

**195 Ft Level**

Orbiter access arm (OAA)

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Table 130-1 Post Launch Walkdown Inspection Areas

215 Ft Level - GH2 Vent Line/GUCP

Latch position  
Loose cables  
Damage from SRB plume  
Damage to the QD

255 Ft Level - GO<sub>2</sub> Vent Arm, Ducts, Hood

Seals  
Hood windows, doors, latches

Fixed Service Structure (FSS)

Cable tray covers  
Signs  
Hydraulic leaks  
Slidewire baskets

PAD Apron/Acreage

Vehicle hardware and/or flight TPS materials  
Facility debris

Table K-1 PAD Apron/Acreage Items

<u>Description</u>	<u>Location</u>

\*\*\* End of Table 130-1 - Post Launch Walkdown Inspection Areas \*\*\*

11/29/01

**Table 130-2 Post Launch Photos (MLP, FSS, PAD, Apron, Pad Acreage)**

**MLP 0-level**

1 Ea HDP No. 1, 2, 5 & 6 (HDP shoe and Epon shim)  
1 Ea HDP No. 3, 4, 7 & 8 (blast cover down to HDP base)  
1 Ea SRB T-O umbilical  
1 Ea overall view SRB exhaust cutouts\

Any unusual or debris-related damage to the facility; sound suppression water pipes,  
TSM's cracks in MLP deck, witness panels, handrails, etc.

Any flight hardware debris (tiles, SRB ordnance fragments)  
Any facility debris (nuts, bolts, cable tray covers, etc.)

**FSS**

Close-ups of GUCP and latching mechanism  
Overall views of GO<sub>2</sub> vent hood/ducts, if damaged  
Any flight hardware or facility debris  
Any unusual or debris-related damage to the facility

**PAD Apron/PAD Acreage**

Any flight hardware or unusual facility debris objects

Any unusual or debris-related damage to the PAD (such as missing brick in the flame  
trench), perimeter fence, etc.

**\*\*\* End of Table 130-2 - Post Launch Photos (MLP, FSS, PAD, Apron, Pad  
Acreage) \*\*\***

**\*\*\* End of Operation 130 \*\*\***

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## OPERATION 140 Film Review

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 15.0

### NOTE

This operation may be not performed after launch scrub.

Operation 140 Not Performed:

ET  
01  
11/29/01

### NOTE

Analysis of Pad Debris Inspection Results determines priority for film review. All critical film (as determined by the Debris Team) must be reviewed as soon as possible after launch and no later than 36 hours prior to entry (of the Orbiter into the earth's atmosphere).

140-1 Review and analyze all engineering launch (and flight) film to:

- Identify any debris damage to the SSV
- Identify flight vehicle or ground system damage that could affect Orbiter flight operations of future SSV launches.

Disc  
140-1

OMRSD S00U00.011-1

ETM N/A Date N/A

140-2 Operation - Film Review complete.

ETM N/A Date N/A

\*\*\* End of Operation 140 \*\*\*

ET  
01  
11/29/01

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

## OPERATION 145 IR Camera Removal

Shop: PH-H  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 2.0

### WARNING

Hard hats required on the Pad when SSV is not present.

### CAUTION

Exercise care to avoid dropping equipment, fasteners, etc from RSS roof to prevent damage to equipment or injury to personnel. All tools must be tethered.

### NOTE

IR Camera removal from RSS Roof site may be not performed in launch scrub turnaround scenarios.

145-1      **Remove** IR camera at RSS Roof Site as follows.

1.      **Remove** fasteners (2 pl) from camera housing front. **Retain** fasteners for reinstallation when front cover is installed.
2.      **Install** camera housing front cover using previously removed fasteners (2 pl). **Tighten** fasteners (2 pl) wrench tight.



**WARNING**

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

**CAUTION**

Do NOT allow back cover to exert undue force on cables when opening/rotating back cover.

3. **Rotate** camera housing back cover into open position by removing bolts with flat washers (20 pl). **Retain** bolts/washers for reinstallation.
4. **Disconnect:**
  - Power cable
  - Pan & tilt cable
  - Controller cable
  - OTV coaxial cable
5. **Unlock** spring pin at lower, left to release IR camera Unit in camera housing. **Remove** IR Camera Unit from camera housing by carefully sliding it out the back opening of the camera housing. **Support** IR Camera Unit during removal.
6. **Rotate** camera housing back cover into closed position. Do not pinch cables. **Secure** back cover by reinstalling bolts/flat washers (20 pl). **Tighten** bolts wrench tight.

09-01-2001  
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**WARNING**

**Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system.** Ensure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear **N-Dex nitril gloves** and **chemical splash goggles**. When working at eye level or above wear a **face shield** over goggles.

WS002.a 05-22-01

7. **Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rympie cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl alcohol.
8. **Route** IR Camera Unit to VAB 3K1 for refurb/checkout.

NASA PH-H N/A Date N/A

USA ETM N/A Date N/A

Not Performed:

ET  
01  
11/29/01

**NOTE**

IR Camera removal from Camera Site 2 may be not performed in launch scrub turnaround scenarios.

**145-2 Remove IR camera from Camera Site 2 as follows.**

1. **Remove** bolt(s) from camera housing front. **Retain** bolt(s) for reinstallation when front cover is installed.
2. **Install** camera housing front cover using previously removed bolt(s). **Tighten** bolt(s) wrench tight.

**WARNING**

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

**CAUTION**

Do NOT allow back cover to exert undue force on cables when opening/rotating back cover.

3. **Loosen** screws (8 pl) securing camera housing back cover using Phillips screwdriver. **Rotate** camera housing back cover to open position. **Retain** bolts/washers for reinstallation.
4. **Disconnect:**
  - Power cable
  - Pan & tilt cable
  - Controller cable (2 pl)
  - OTV coaxial cable
5. **Unscrew** set screw(s) at lower, left/right to release IR camera Unit in camera housing. **Remove** IR camera Unit from camera housing by carefully sliding it out the back opening of the camera housing. **Support** IR camera Unit during removal.
6. **Coat** camera housing back cover O-ring with a single coat of (1) tube/jar 6505-00-133-8025 Petroleum Jelly, Vaseline (or equivalent) .

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

7. **Rotate** camera housing back cover into closed position. Do not pinch cables. **Secure** back cover by installing screws (8 pl). **Tighten** screws wrench tight using Phillips screwdriver.

**WARNING**

Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system. Ensure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear N-Dex nitril gloves and chemical splash goggles. When working at eye level or above wear a face shield over goggles.

WS002.a 05-22-01

8. **Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl alcohol.
9. **Route** IR Camera Unit to VAB 3K1 for refurb/checkout.

NASA PH-H N/A Date N/A

USA ETM N/A Date N/A

Not Performed:

10/29/01

\*\*\* End of Operation 145 \*\*\*

09-01-2001  
APPROVED

OMI S6444 J02  
APPROVED

## OPERATION 150 Final Report

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.5

### NOTE

This operation may be not performed after launch scrub.

Operation 150 Not Performed:

ET  
01

11/29/01

- 150-1** Assemble final report by attaching following reports to this OMI.  
Reference each to this step.

Post Launch PAD Assessment  
SRB Assessment  
Launch Film Review  
Launch Day Video Review  
Orbiter Landing Assessment  
ET Separation Review

- 150-2** Final report assembly complete.

ETM N/A Date N/A

- 150-3** Operation - Final Report complete.

\*\*\* End of Operation 150 \*\*\*

ET  
01

11/29/01

```

*****
*  PROGRAM PRA120 SELECTION CRITERIA
*  -----
*
*  RPT TYPE: IPR
*
*  PR GROUP:
*
*  WORK AREA CD:
*
*  PR ELEM CD:
*
*  STS NO:
*
*  Starting RPT DT: 11/09/01
*
*  Ending RPT DT: 12/14/01
*
*  LRU or Non-LRU: B
*
*  PRACA EFF CD:
*
*  EICN:
*
*  RPT STATUS: OP
*
*  DETECTED DURING: S6444
*
*  -----
*  Sorted by DETECTED DURING, PR ELEM CD, and EICN
*
*****

```

DATE: 12/14/01 10:47  
REPORT : PRAL200A

PROBLEM REPORTING AND CORRECTIVE ACTION SYSTEM  
PROBLEMS BY DETECTOR RING

PAGE: 1

DETECTED DURING: S6444 FILM REVIEW-STS105

WORK AREA CD: PAD-A

WORK AREA LOC:

PART PROG NO:

PART PROG NM:

FUNCT CRIT:

HM CRIT:

SERIAL REV NO:

REPL SER NO:

FINAL ACPT DT:

TECH STAMP:

GOVT STAMP:

GOVT CD:

CONTR STAMP:

CONTR CD:

VALIDATOR ID/NM:

VALIDATOR DT:

IV-6-381703

YES

S0007VL2

HAZARD OP CD:

HAZARD OP:

QTY/UNITS:

RPTED BY ID/NM: T08011

SEALE,

RANDALL D

USA 53910

(321)861-3348

12/10/01 09.01

DATA CODE:

NHA PN IDID:

ETH

RSPBL ORG:

RC ACTION REQ:

RC CONSTRAINT TO:

RC CONSTRAINT DT:

RC CONSTR ID/NM:

RC CLOSURE ID/NM:

RC CLOSURE DT:

RC CLOSURE ID/NM:

RC CLOSURE DT:

RELATED RPTS:

DESCRIPTION: ITEM PAGE

1 1

POST LAUNCH FILM ANALYSIS OF FILM E-18 SHOWS A CYLINDRICAL SHAPED OBJECT  
COMING INTO VIEW AT 21:10:15.643 GMT BEST ESTIMATE OF OBJECT IS THAT IT  
IS A 3" L X .75" DIA FACILITY BOLT

\*\*\*\*\*  
\*  
\* TOTAL ELEMENTS DETECTED DURING: S6444 FILM REVIEW-STS105 = 1 \*  
\*  
\* TOTAL DETECTED DURING FOR THIS REPORT = 1 \*  
\*  
\*\*\*\*\*

\*\*\*\*\*  
\*  
\* END OF REPORT \*  
\*

DEC 14 01



OH NOTE 1A TO Red B

[illegible]





# INSPECTION COPY

TOP/WAD Deviation

TOP/WAD No. <b>S6444</b>		Dev No. <u>50-01</u>	DILS No. <u>927149</u>	Page 1 of 1
REV/CHG/VER <b>J02</b>		<input type="checkbox"/> In Family <input type="checkbox"/> Out of Family <input checked="" type="checkbox"/> NMA	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-108		Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT		
Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE		<input checked="" type="checkbox"/> Internal Review Req		
Contractor OPR <i>R. Seale</i> 11/15/01		Contractor Test Conductor <i>John K. Kearsney</i> 11/15/01		Govt OPR <i>PH-H2</i>
Contractor Test Project Engineer <i>T.W. Adams</i> 11-15-01		Other <i>SE check</i>		Govt Project Engineer <i>11-15-01</i>
Contractor Safety		Other <i>Wm R. R. E. 11/15/01</i>		Govt Test Director or Contractor Chief TC <i>11/14/01</i>

Page Number: 50-10 Step Number: 50-19

Add Note and Step 50-19-1:

**NOTE**

Ref: NSTS 16007 (LI) NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem Appendix F - Ice Launch Commit Criteria defines "No-Go Conditions".

50-19-1 CICE CTIF 222

Verify there are no Ice Launch Commit Criteria "No-Go Conditions" being violated.

ETM: *R. Seale* Date 11/29/01Reason: Provide positive verification that LCC have not been violated.

# INSPECTION COPY

Originator (print) <b>R. Seale</b>	SPDMS ID <b>T08011</b>	Phone <b>1-3348</b>	Organization <b>ETM</b>	Date <b>11/14/01</b>	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle	<b>ET</b> <b>01</b>
---------------------------------------	---------------------------	------------------------	----------------------------	-------------------------	-----------------------------------------------------------------------------------------------------------------	------------------------